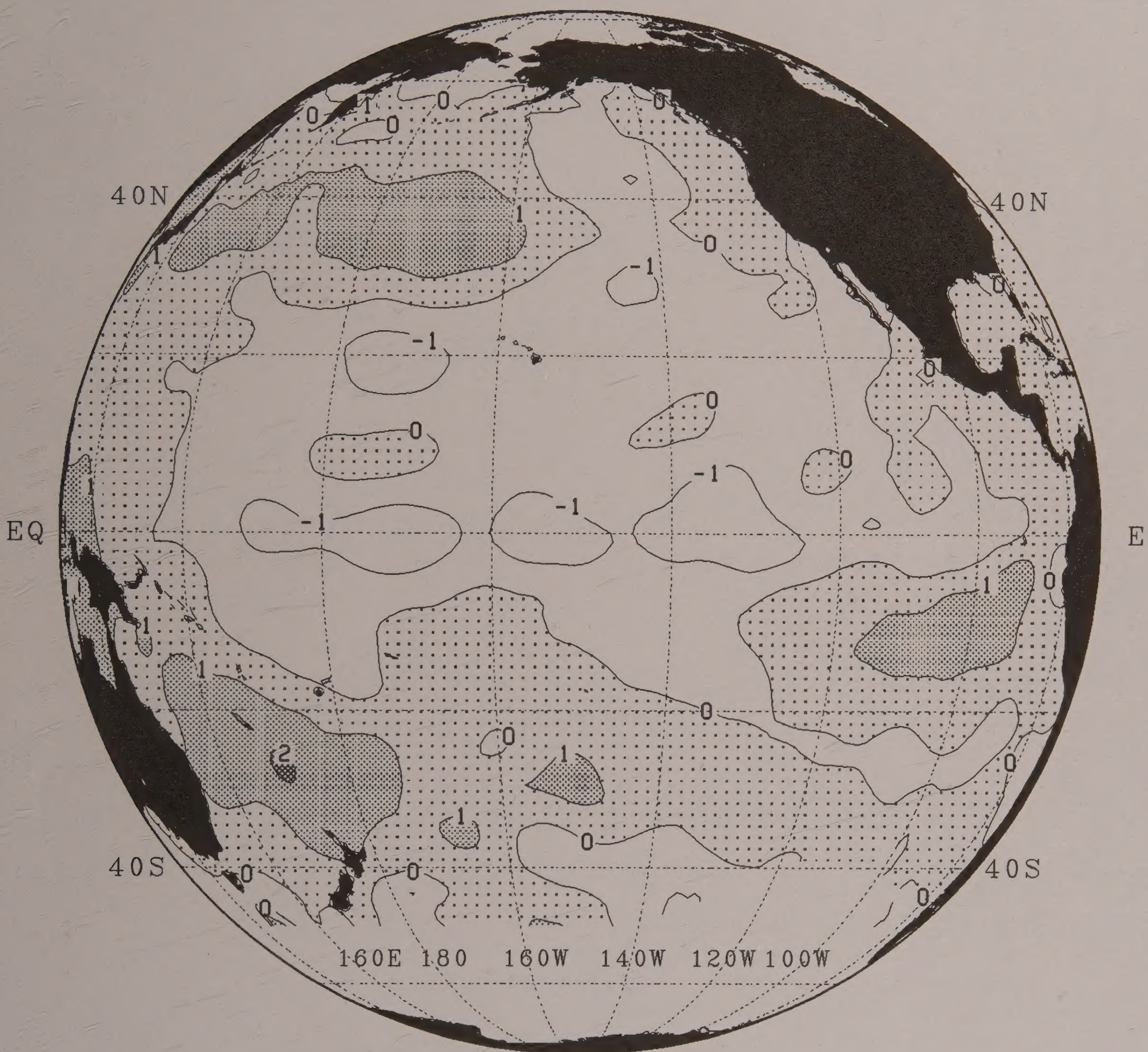
気象庁海洋月報

Monthly Ocean Report

October 1998 (No. 70)



Climate and Marine Department
Japan Meteorological Agency

気象庁 気候・海洋気象部

平成１０年１０月

気象庁海洋月報は、気象庁 気候・海洋気象部 海洋課で作成しています。

本月報に関する問い合わせは、

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Monthly Ocean Report is prepared by the Oceanographical Division, Climate and Marine Department, Japan Meteorological Agency.

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表紙は、1998年10月の太平洋の月平均海面水温偏差図です。

陰影部は、平年より高温の海域を示しています。

The figure on the front cover shows the monthly mean SST anomalies for October 1998 in the Pacific Ocean.

Areas of positive anomalies are shaded.

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海況の特徴（１９９８年１０月）

日本近海の海況

海面水温は，全般に平年より高く，日本海全域，四国・九州沿岸から南西諸島にかけて，及び房総半島沖から本州東方沖にかけて，平年より１℃以上高かった（第4図）。

黒潮は，種子島の南東で蛇行し，四国・紀伊半島に接岸した後，東に流れ，上旬は八丈島付近，中旬は八丈島の北をそれぞれ北東進して，房総半島沖を東に流れていた。下旬は，東海沖を南東に流れ，八丈島付近を北上した後，房総半島沖を東に流れていた（第9図）。

親潮系の冷水は39.0゜N，142.7゜Eまで達していた（第5図）。

太平洋の海況

太平洋赤道域の海面水温は，負偏差域が９月より東に広がり，155゜Eから90゜Wにかけて見られた。フィリピンの南から140゜Eにかけては，９月に引き続き＋1℃以上の正偏差であった。

北太平洋では，30゜N～45゜Nの160゜W以西で平年より1℃以上高かった。オホーツク海北部，20゜N，175゜W付近，30゜N，145゜W付近，及び45゜N，145゜W付近に-1℃以下の負偏差域が見られた（第16図）。

Highlights October 1998

Seas adjacent to Japan

Positive SST anomalies prevailed in seas adjacent to Japan, and SSTs were more than 1°C above normal in the Japan Sea, from the coasts of Shikoku and Kyushu to Nansei Islands, and from the seas off the Boso Peninsula to east of Honshu (Fig. 4).

The Kuroshio meandered southeast of Tanegashima and flowed along the coasts from Shikoku to the Kii Peninsula, then flowed eastward. It passed northeastward near Hachijo Island in the first 10-day and north of the island in the second 10-day, then flowed eastward off the Boso Peninsula. In the last 10-day, the Kuroshio flowed southeastward off Tokai, northward near Hachijo Island, and eastward off the Boso Peninsula (Fig. 9).

The Oyashio cold water extended southward to 39.0°N, 142.7°E (Fig. 5).

Pacific Ocean

In the equatorial Pacific, the region of negative SST anomaly expanded eastward and dominated from 155°E to 90°W, whereas positive SST anomalies exceeding +1℃ remained west of 140°E.

In the North Pacific, positive SST anomalies exceeding +1℃ prevailed west of 160°W between 30°N and 45°N. Negative SST anomalies exceeding -1℃ were observed in the northern part of the Sea of Okhotsk and in seas around 20°N, 175°W, around 30°N, 145°W, and around 45°N, 145°W (Fig. 16).

凌風丸によって観測された1998年10月の赤道潜流

The Equatorial Undercurrent observed by the R/V Ryofu Maru in October 1998

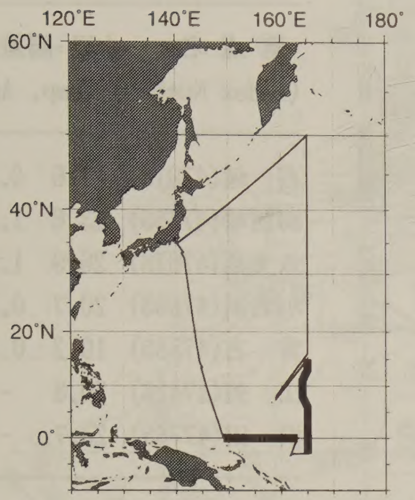


図 A. 凌風丸 1998 年 9 ~ 11 月航海の航跡図

Fig. A. Track chart of the R/V Ryofu Maru from September to November 1998.

気象庁の観測船「凌風丸」は, 1998 年 9 月から 11 月にかけて, 北西太平洋において海洋観測を行った。このうち, 10 月 12 ~ 23 日には, 西太平洋の 165°E に沿って赤道を横切る海洋観測と, 赤道に沿った海洋観測 (図 A 中の太線) を実施した。この時期, 太平洋赤道域の中・東部では表層水温が平年より低く, ラニーニャ現象時にみられる特徴を呈していた。

今回の観測では, 赤道潜流の東向き成分は 155°E 以東の水深 100 ~ 200 m においてほぼ 60 cm/s 以上となっており, 1996 年及び 1997 年の同時期に行った観測に比べ強かった (図 B, 本月報 No. 58 参照)。

The R/V Ryofu Maru of JMA conducted oceanographic observations along the 165°E meridian and along the equator in the tropical region of the western Pacific from October 12 to 23, 1998 (Fig. A). Tropical Pacific was under the cold episode conditions during the observation.

According to the observations, the eastward component of the Equatorial Undercurrent exceeds 60 cm/s at 100–200m depth east of 155°E (Fig. B), which is stronger than those observed in November 1996 and October 1997 (see this report No. 58).

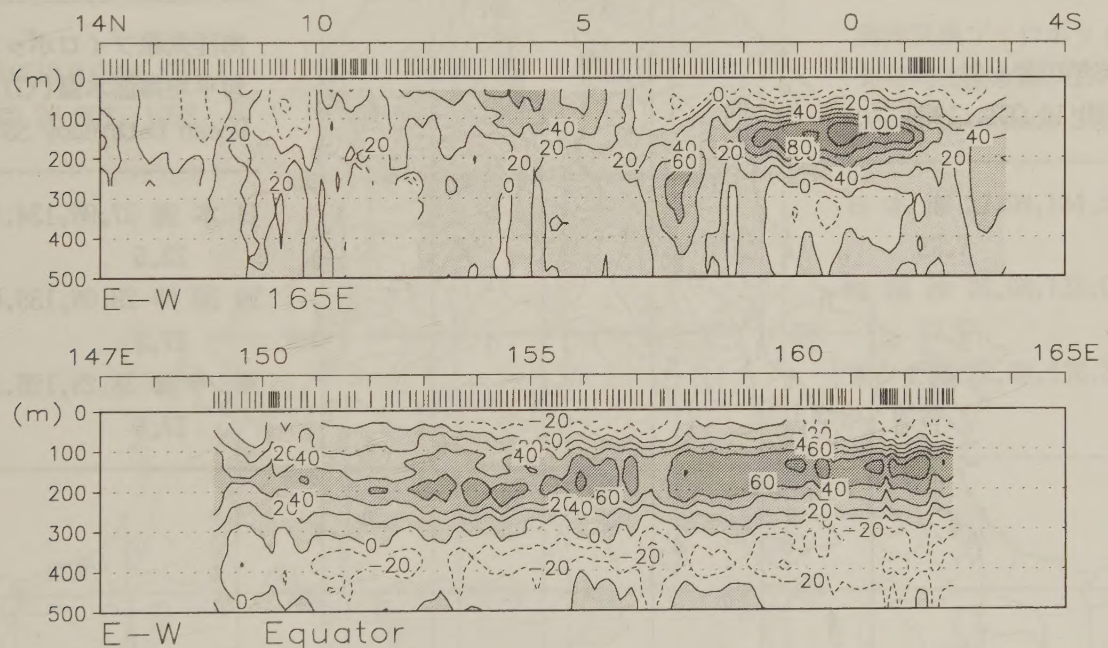
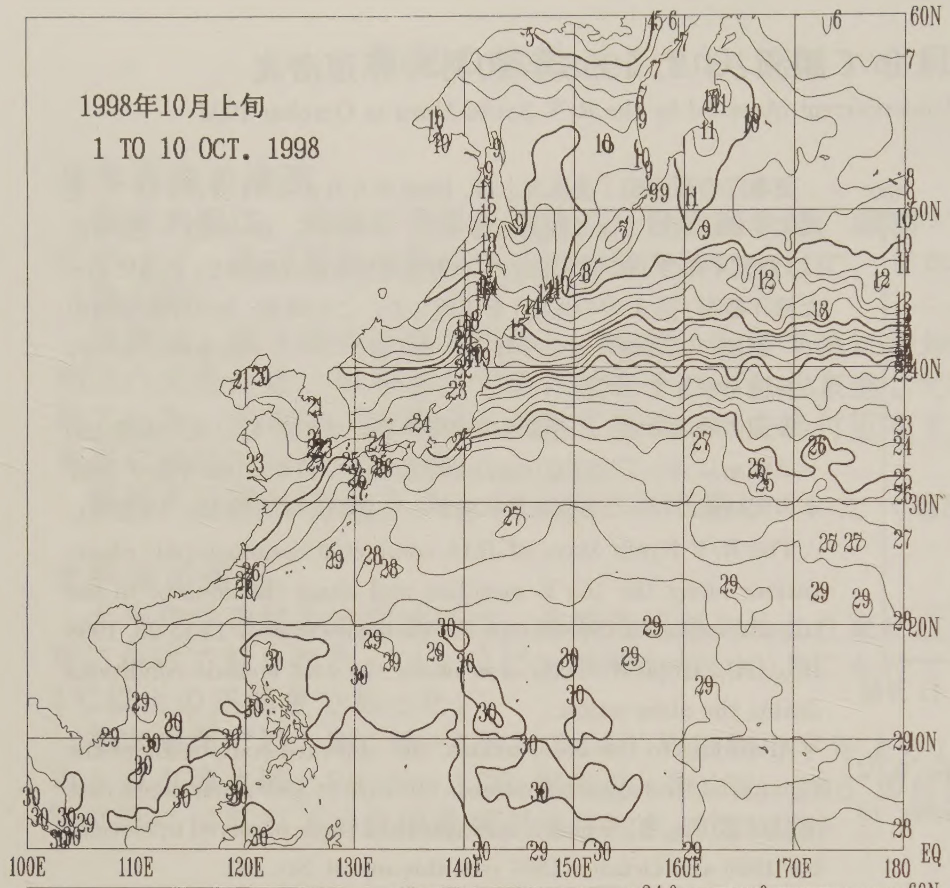


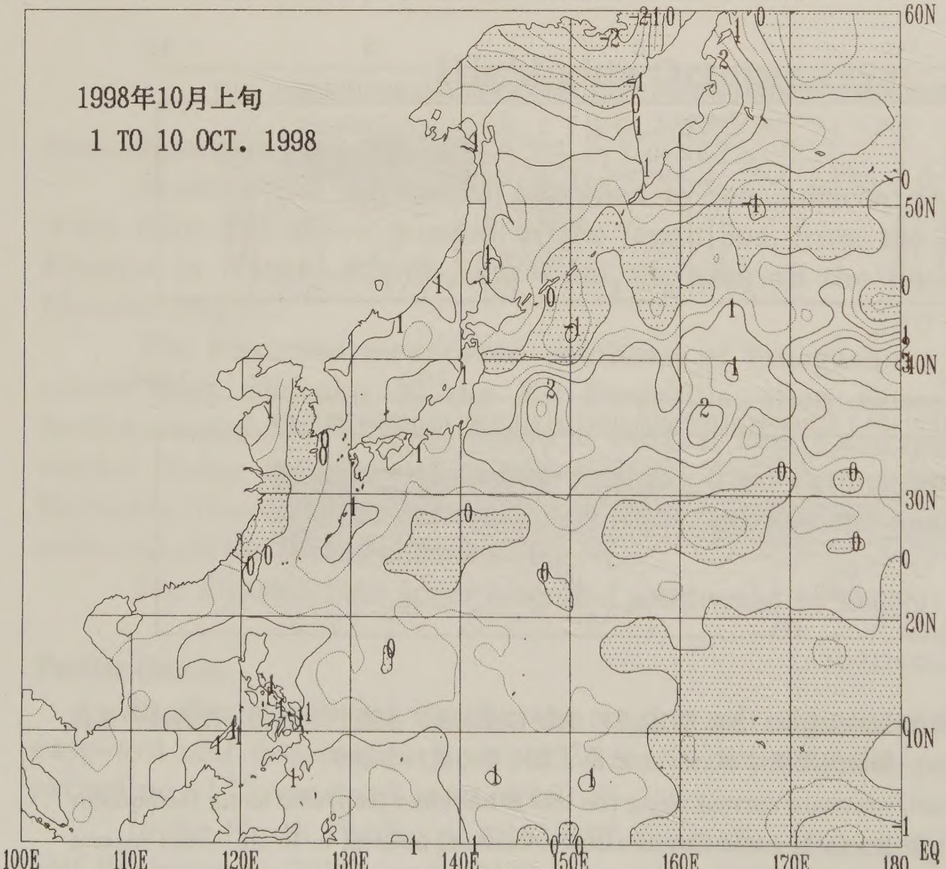
図 B. 凌風丸に搭載した表層海流計による, 1998 年 10 月の 165°E(上) 及び赤道 (下) に沿った海流の東西成分の鉛直断面図 (単位:cm/s). 等値線間隔は 20cm/s. 陰影は東向きの流れを示す.

Fig. B. Vertical section of east/westward current along the 165°E meridian (top) and along the equator (bottom) observed by the R/V Ryofu Maru in October 1998. Contour interval is 20 cm/s and regions of eastward current are shaded.



旬平均沿岸水温(℃)
Coastal Water Temperature

地点名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	27.6	0.3
御前崎(47655)	23.6	1.4
八丈島(47678)	26.9	1.9
小名浜(47598)	20.7	0.1
宮　古(47585)	19.2	0.5
江　差(47428)	20.8	-
浜　田(47755)	23.7	-

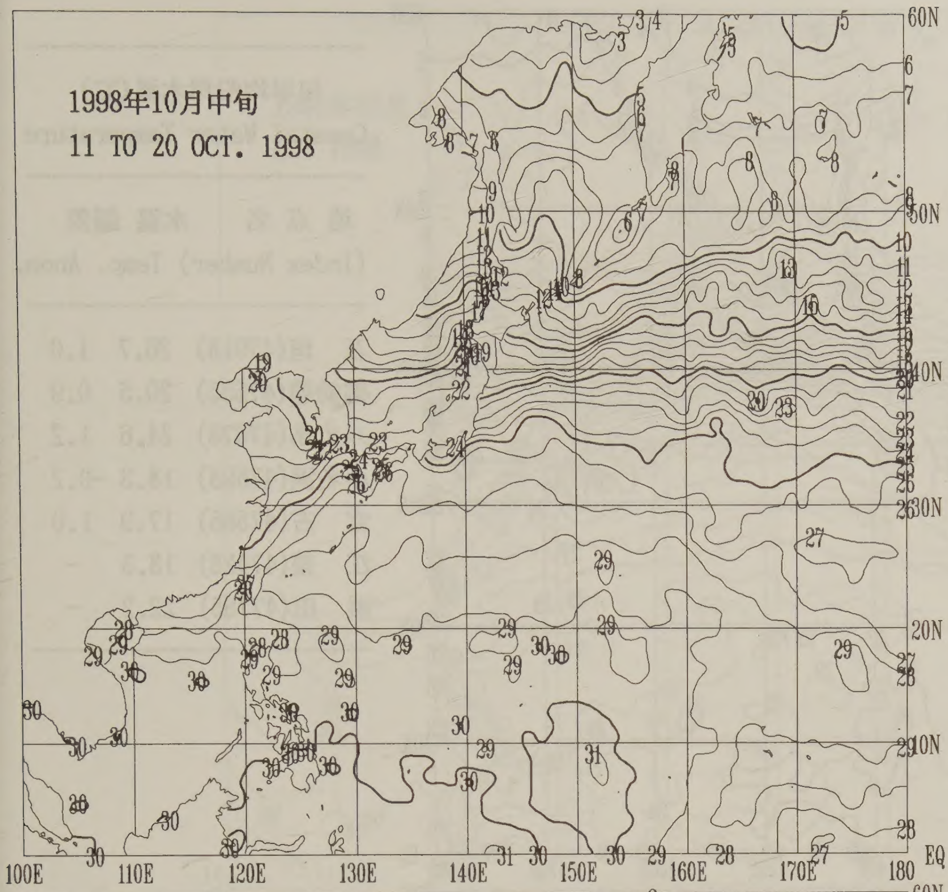


海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日本海	37.9N,134.5E	23.5
四国沖	29.0N,135.0E	27.5
東シナ海	28.2N,126.3E	27.8

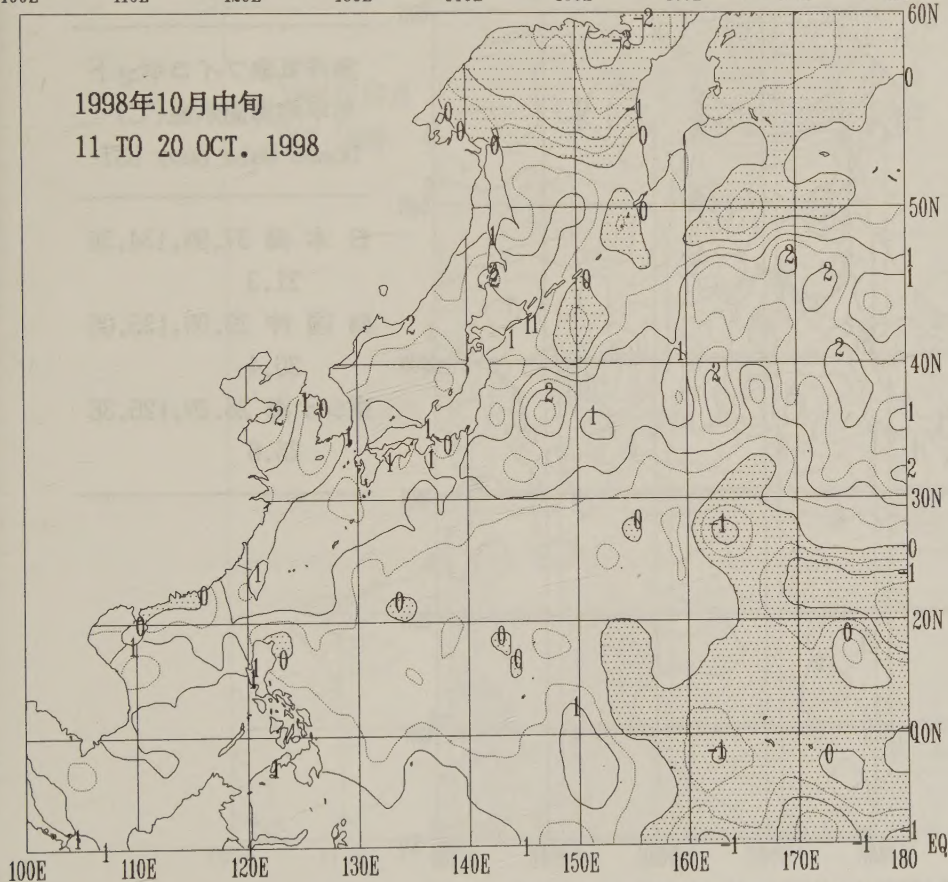
第1図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1998年10月上旬)

Fig.1 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 1st ten-day period in OCT 1998. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



旬平均沿岸水温(℃)
Coastal Water Temperature

地点名 (Index Number)	水温 Temp.	偏差 Anom.
石　垣(47918)	27.2	0.6
御前崎(47655)	22.6	1.6
八丈島(47678)	26.2	2.1
小名浜(47598)	19.8	0.2
宮　古(47585)	18.6	0.6
江　差(47428)	20.1	-
浜　田(47755)	23.0	-

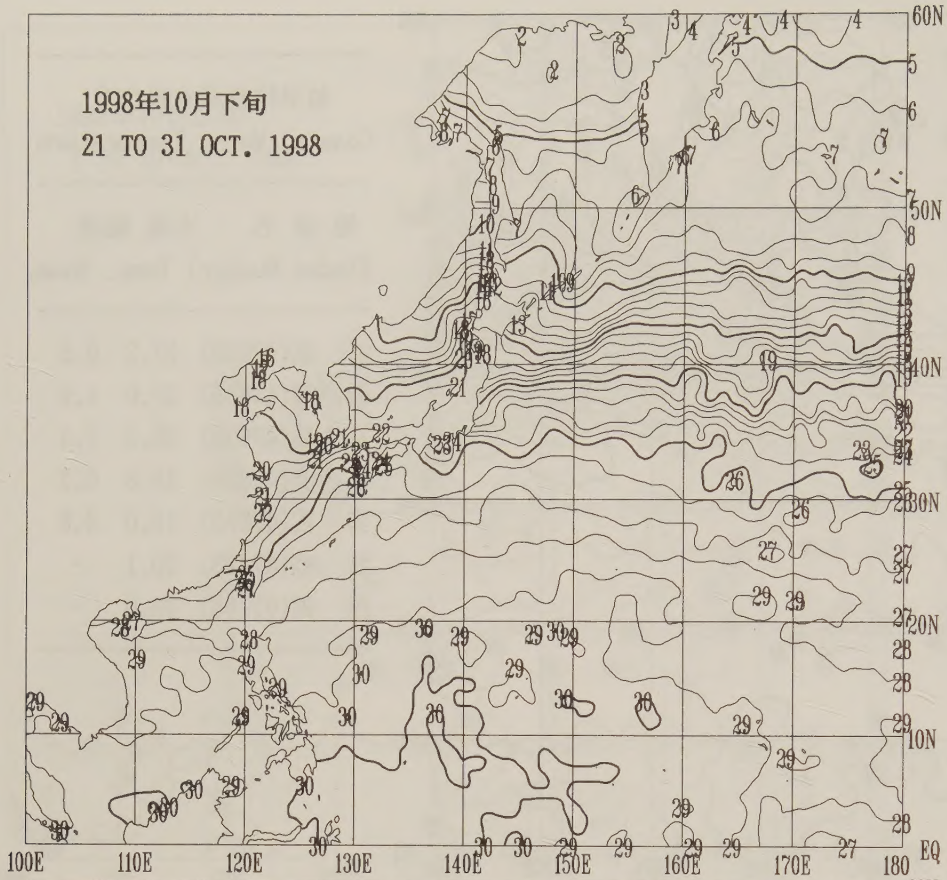


海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日本海	37.9N,134.5E	22.7
四国沖	29.0N,135.0E	27.1
東シナ海	28.2N,126.3E	27.1

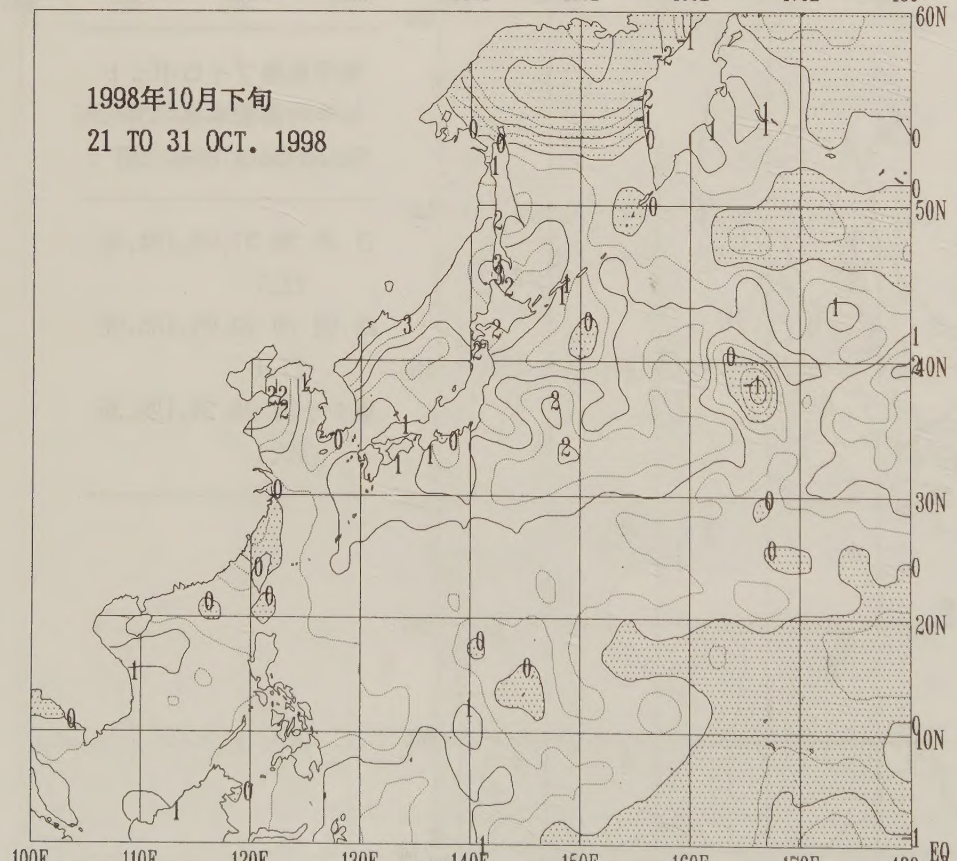
第2図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1998年10月中旬)

Fig.2 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 2nd ten-day period in OCT 1998. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



旬平均沿岸水温(℃)
Coastal Water Temperature

地点名 (Index Number)	水温 Temp.	偏差 Anom.
石垣(47918)	26.7	1.0
御前崎(47655)	20.5	0.9
八丈島(47678)	24.6	1.2
小名浜(47598)	18.3	-0.2
宮古(47585)	17.9	1.0
江差(47428)	18.3	-
浜田(47755)	22.2	-

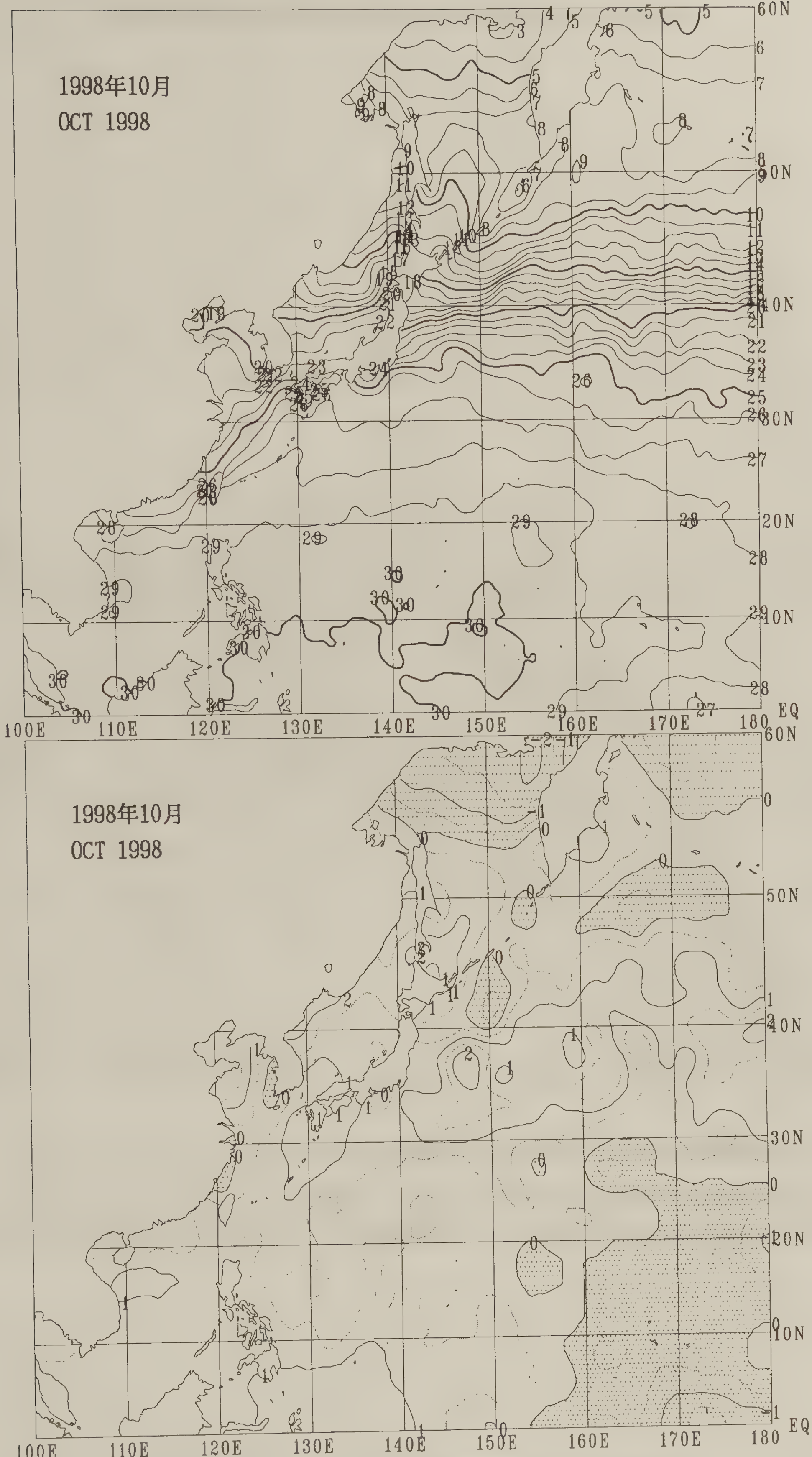


海洋気象ブイロボット
旬平均海面水温(℃)
Ocean Data Buoy SST

日本海	37.9N,134.5E	21.3
四国沖	29.0N,135.0E	26.4
東シナ海	28.2N,126.3E	25.6

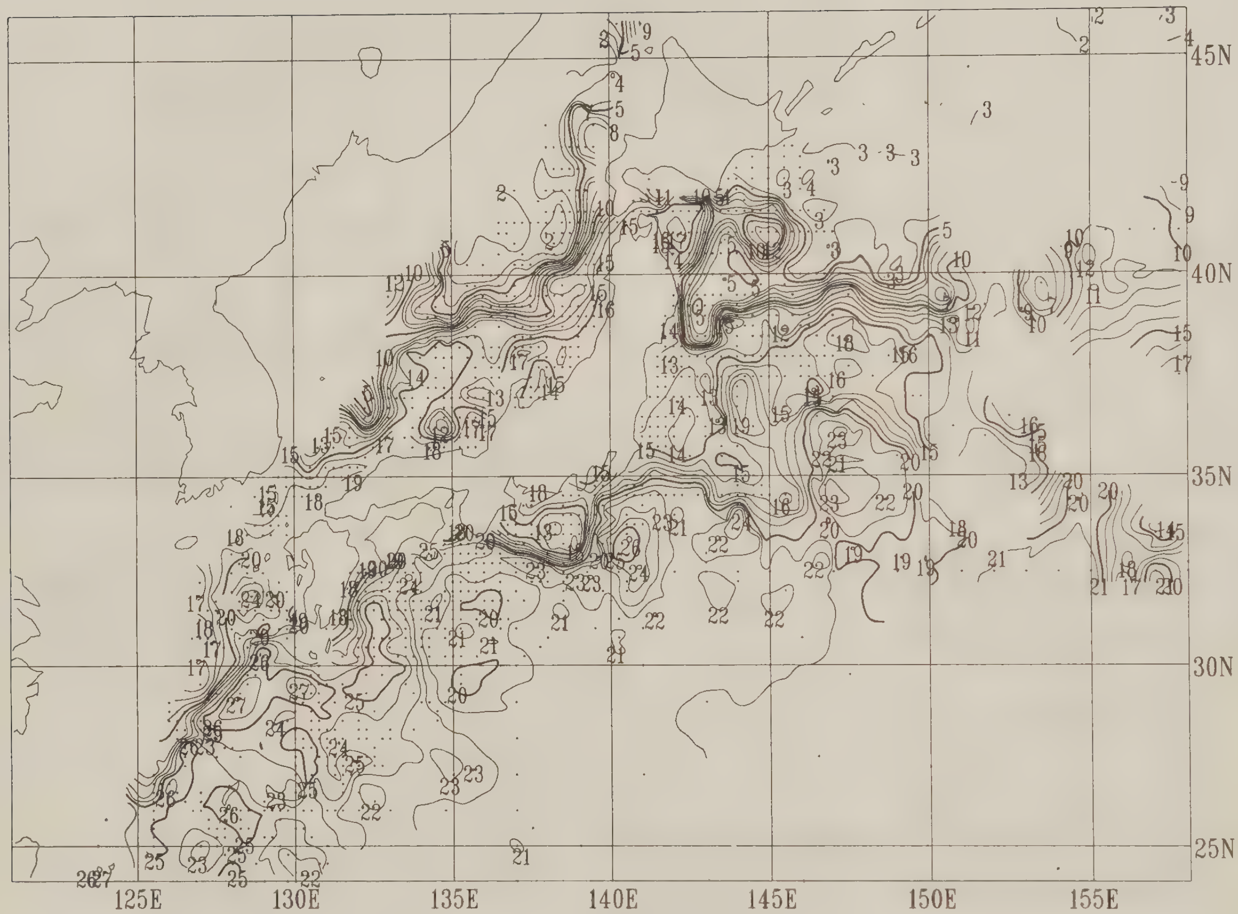
第3図 北西太平洋旬平均海面水温図(上)及び偏差図(下)(1998年10月下旬)

Fig.3 Ten-day mean SST (top) and anomalies (bottom) in the western North Pacific for the 3rd ten-day period in OCT 1998. Anomalies are computed from the JMA climatology (1961-90). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



第4図 北西太平洋月平均海面水温図(上)及び偏差図(下)(1998年10月)

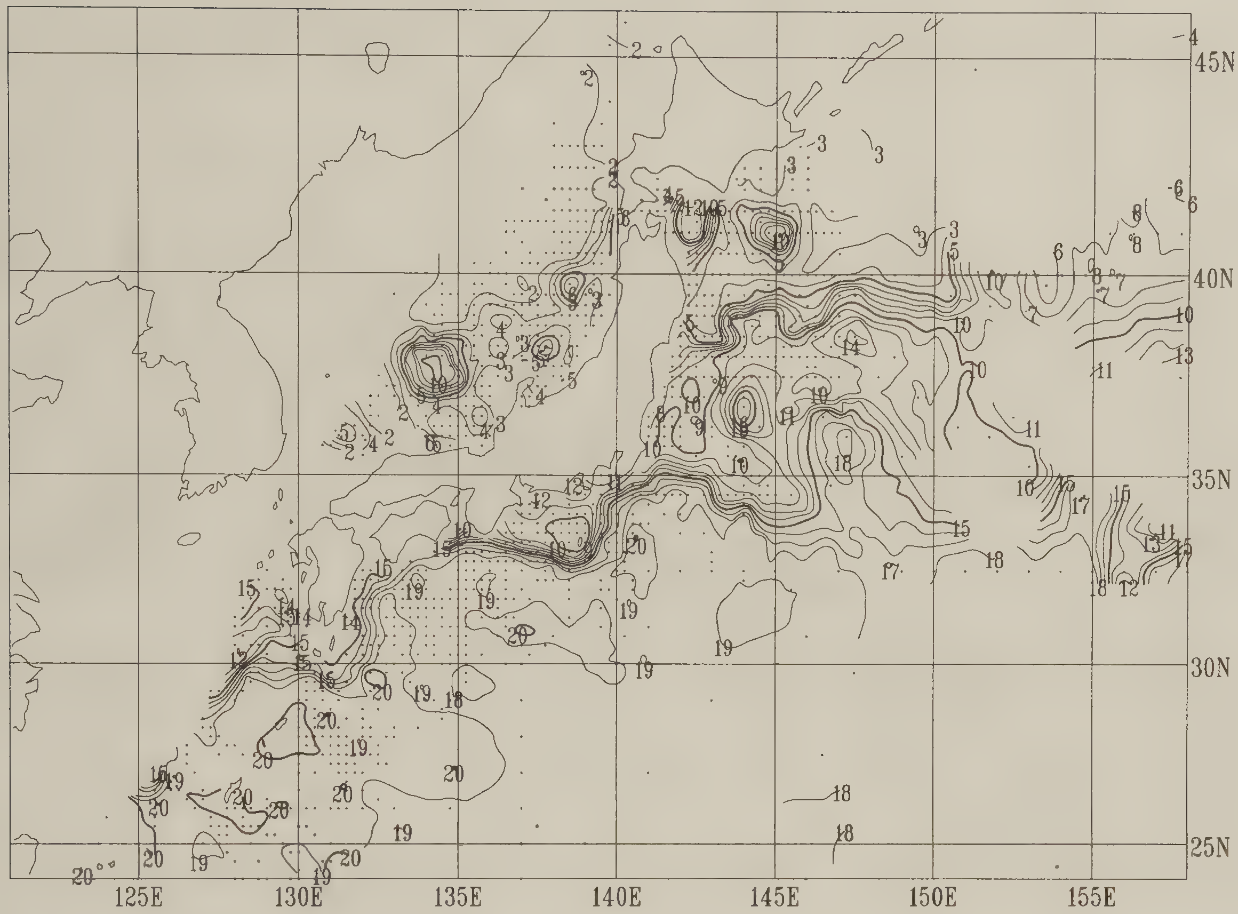
Fig.4 Monthly mean SST (top) and anomalies (bottom) in the western North Pacific for OCT 1998. Anomalies are computed from the JMA climatology (1961-1990). Contour interval is 1°C and additional anomaly contours of 0.5°C are shown by broken lines. Negative anomalies are spotted.



第5図　日本近海表層水温図(深さ100m)（1998年10月)

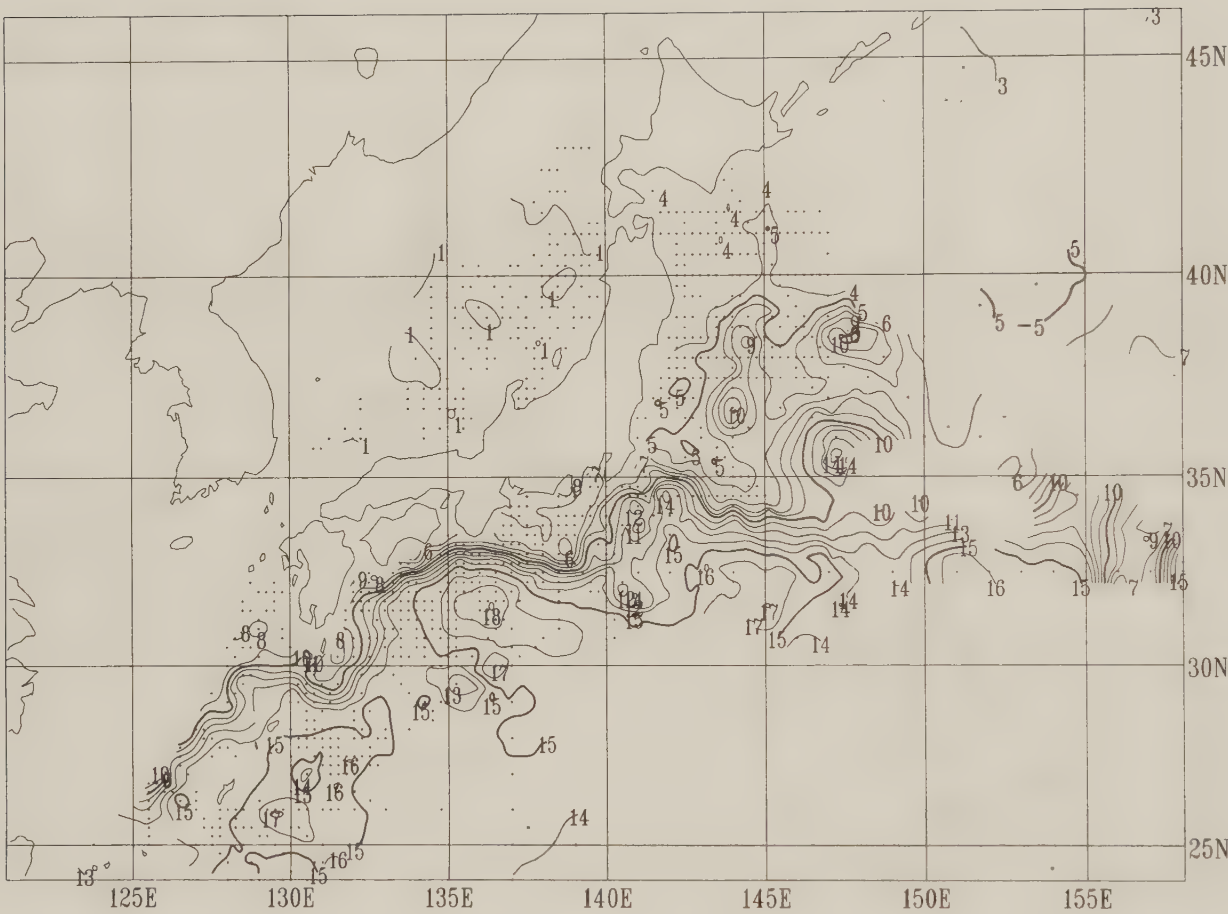
Fig.5 Subsurface (100m) temperatures in the seas adjacent to Japan for OCT 1998. Contour interval is 1°C. Observation points are denoted by dots.

200m Temperatures in the Seas Adjacent to Japan



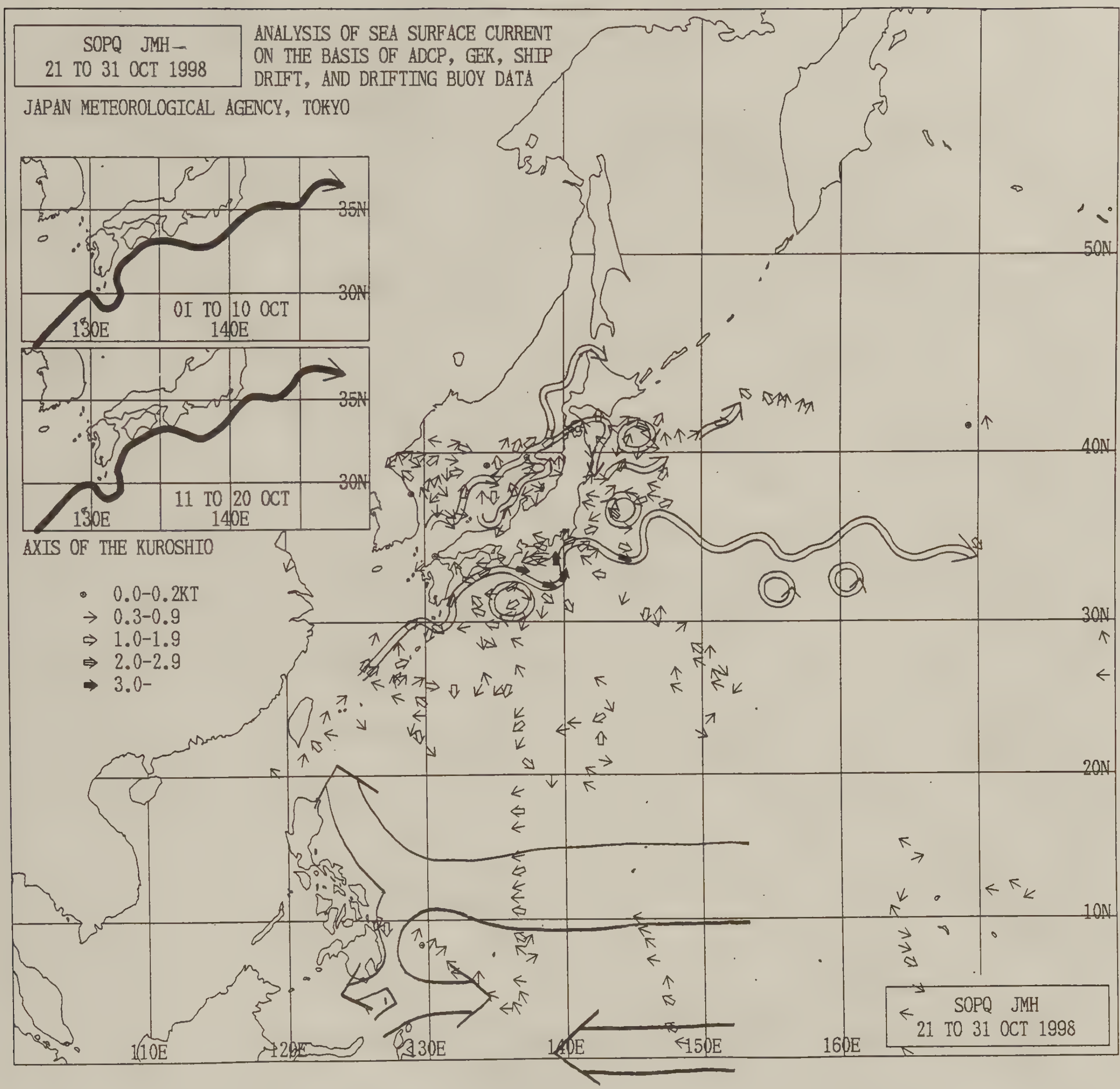
第6図　日本近海表層水温図(深さ200m)（1998年10月)

Fig.6 Subsurface (200m) temperatures in the seas adjacent to Japan for OCT 1998. Contour interval is 1°C. Observation points are denoted by dots.



第7図　日本近海表層水温図(深さ400m) (1998年10月)

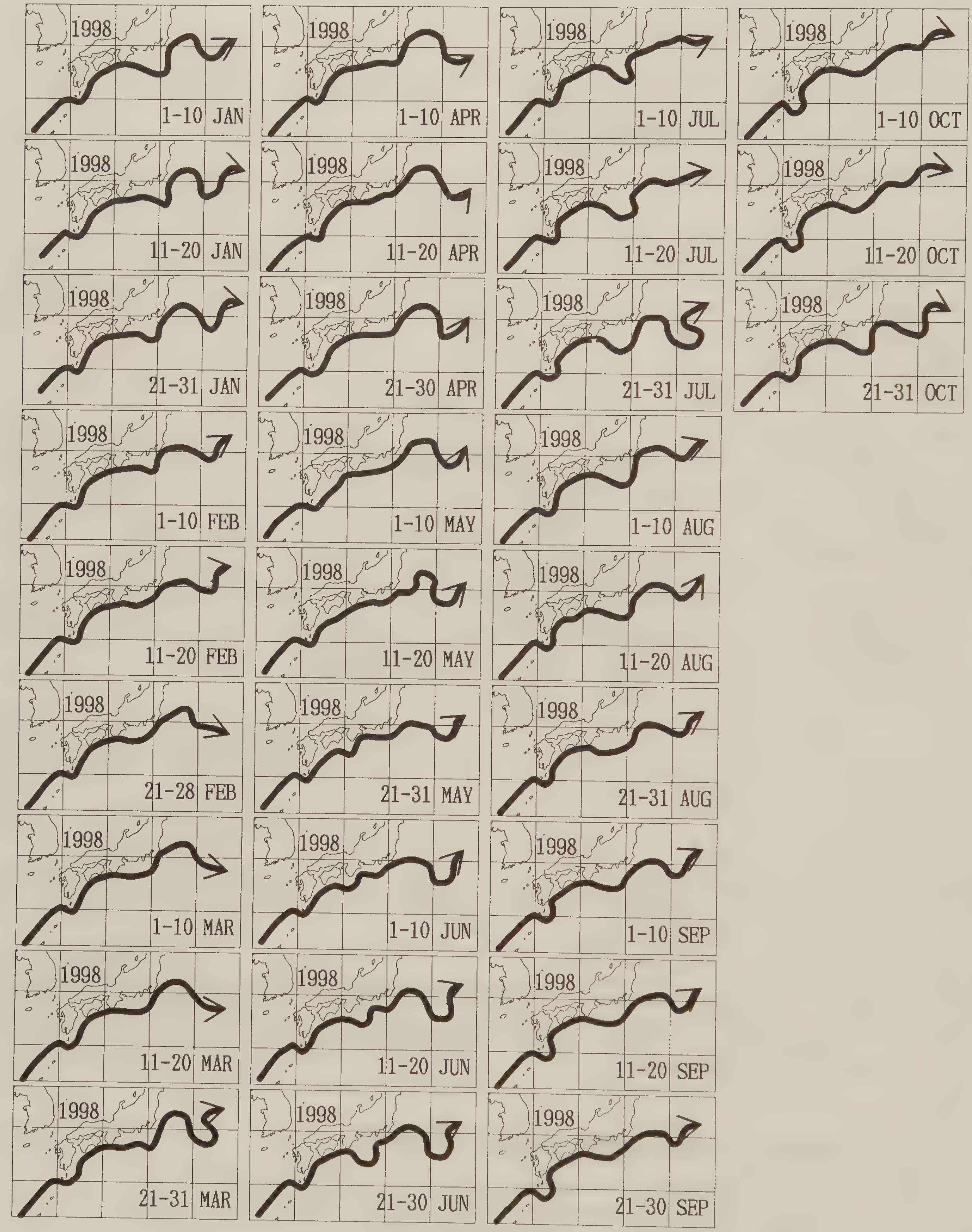
Fig.7 Subsurface (400m) temperatures in the seas adjacent to Japan for OCT 1998. Contour interval is 1°C. Observation points are denoted by dots.



第8図　北西太平洋海流図（1998年10月下旬）

Fig.8 Analysis of the sea surface current in the western North Pacific for the 3rd ten-day period in OCT 1998. Small arrows indicate in situ observations. Major currents such as the Kuroshio and the North Equatorial Current are denoted by larger open arrows.

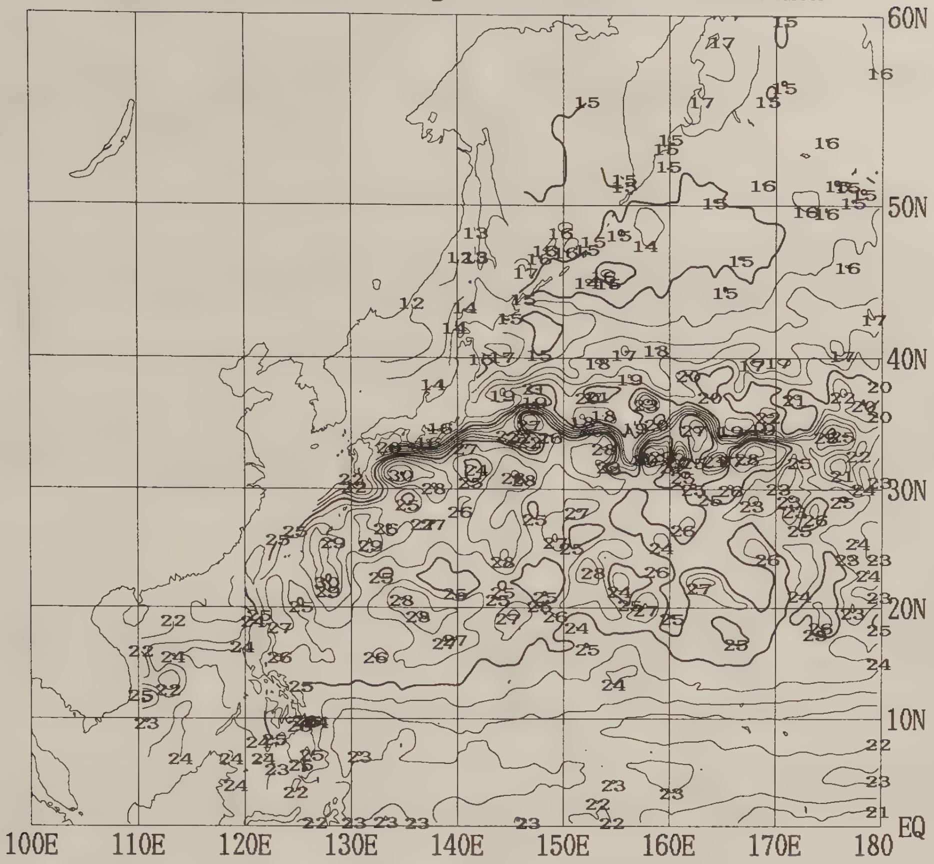
Location of the Kuroshio axis



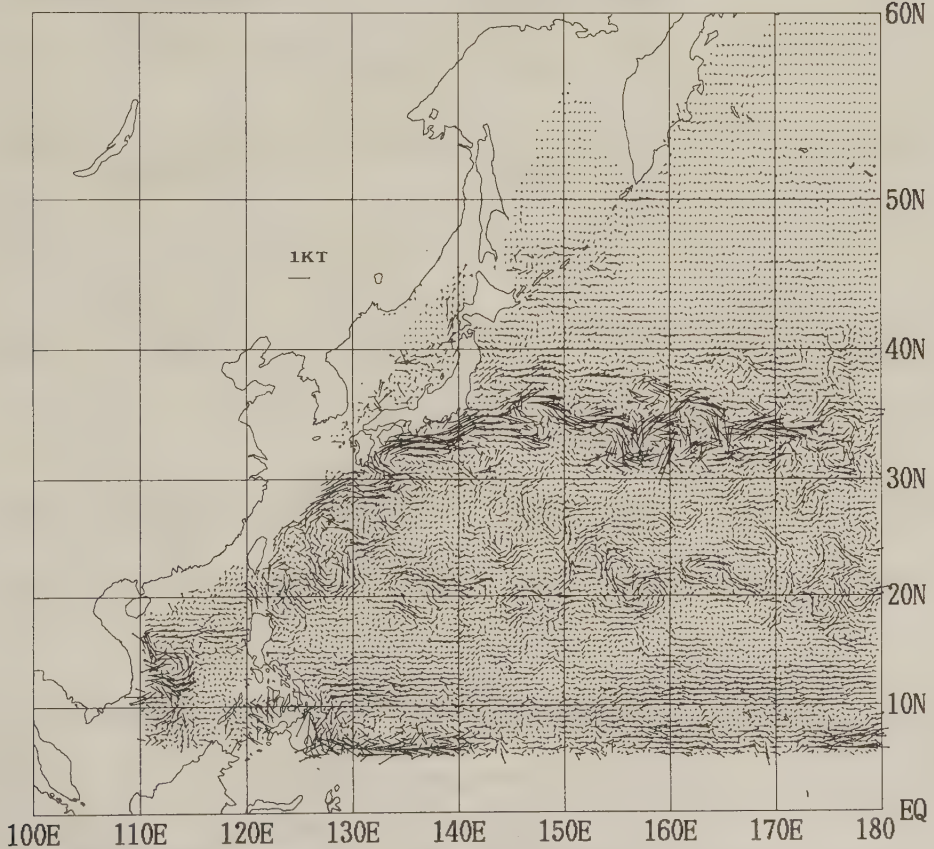
第9図 旬別黒潮流軸図

Fig.9 Location of the Kuroshio axis

Sea surface dynamic heights and current distribution

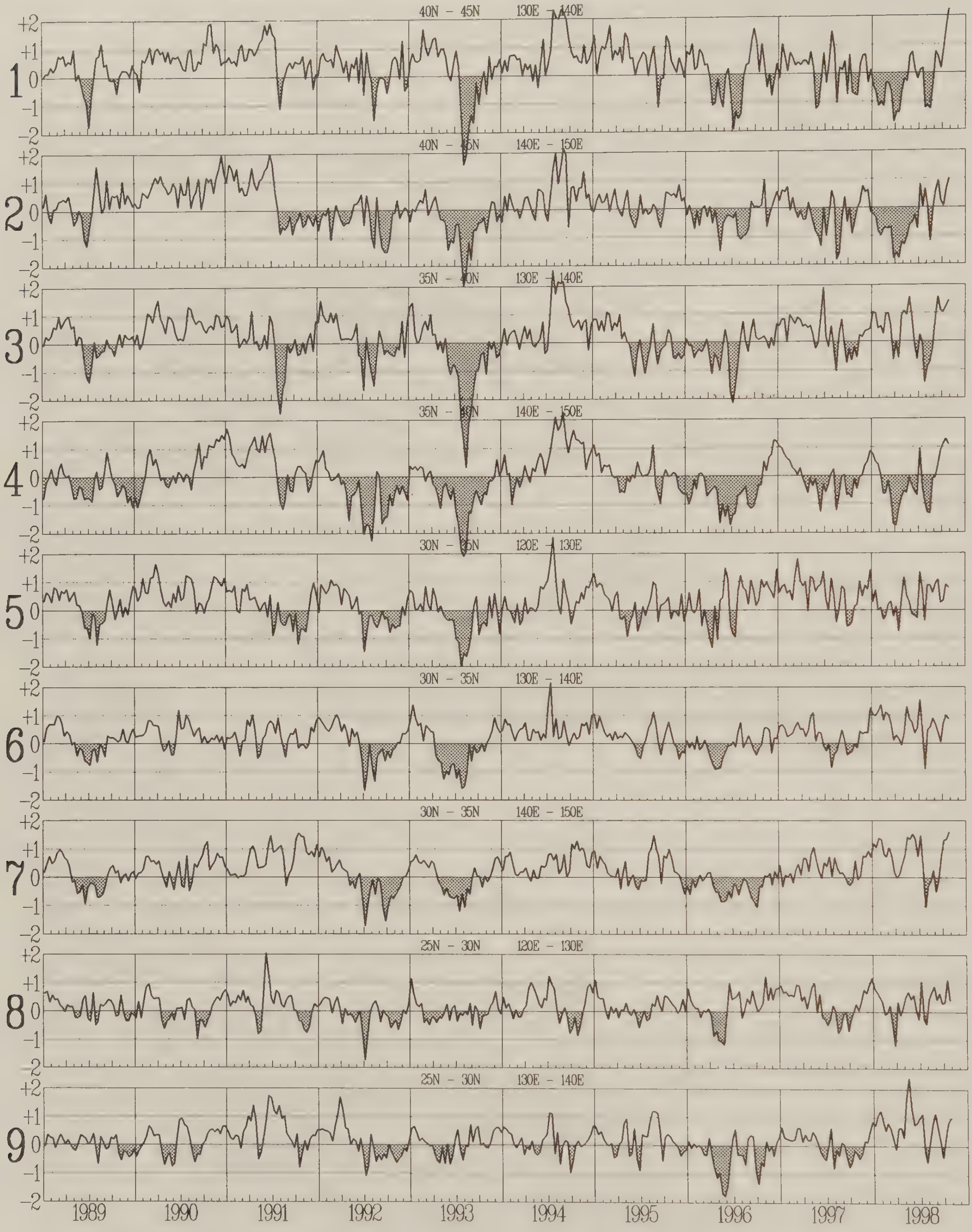


第10図 北西太平洋力学的海面高度分布図(1998年10月8日)
Fig.10 Sea surface dynamic heights (10cm) in the western North Pacific derived from the altimeter data of TOPEX/POSEIDON (OCT 8, 1998).
1500db surface is assumed to be the surface of no motion.



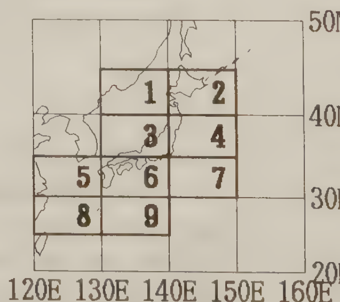
第11図 北西太平洋海流ベクトル図(1998年10月8日)
Fig.11 Sea surface current vectors in the western North Pacific (OCT 8, 1998).
Vectors are derived from the sea surface dynamic heights from TOPEX/POSEIDON and subsurface temperature distribution assuming the geostrophic relation.

Time Series of Area Mean SST in the Western North Pacific

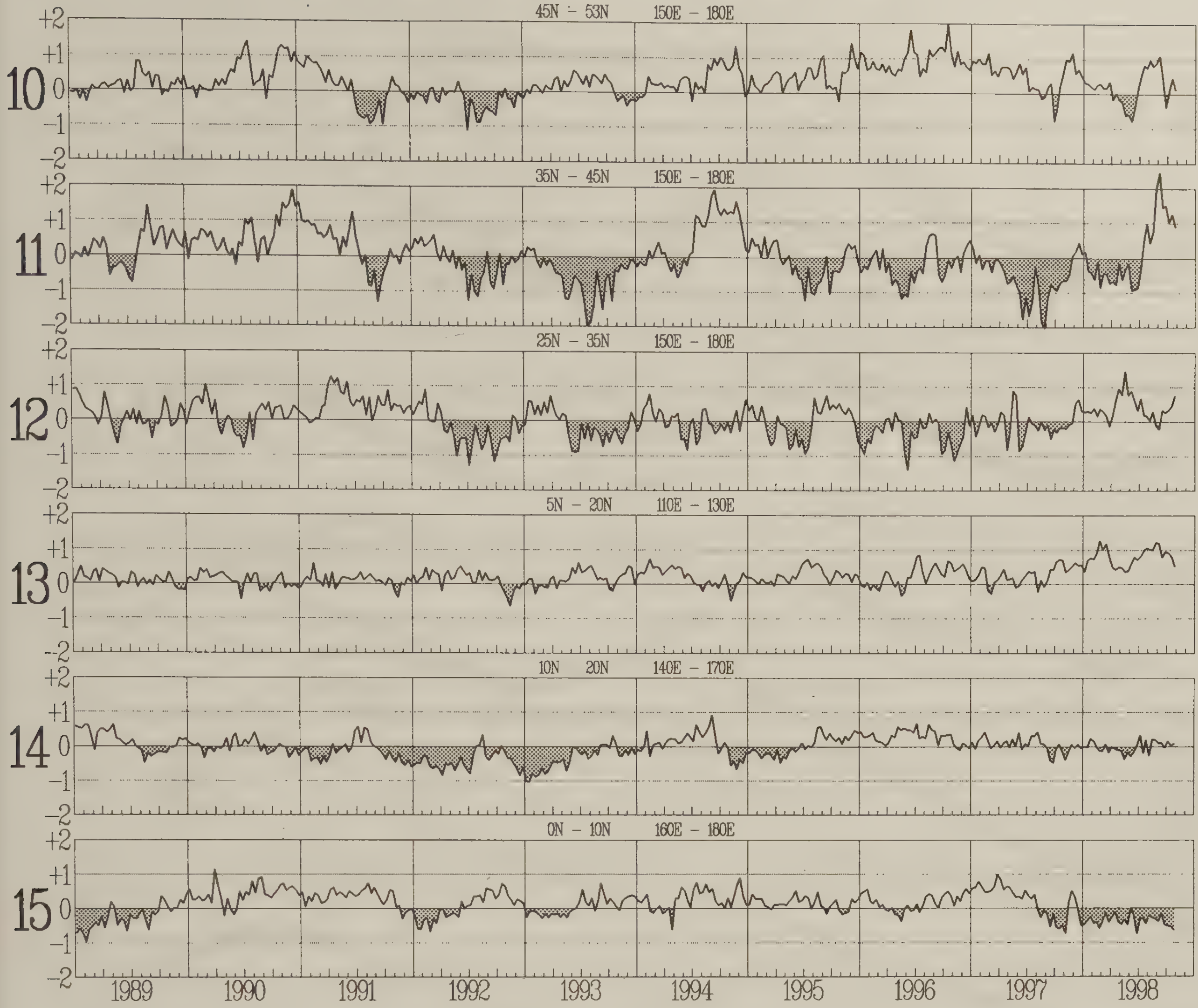


第12図　海域別旬平均海面水温平年偏差時系列図

Fig.12 Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right panel. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).

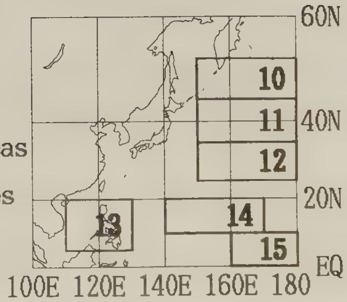


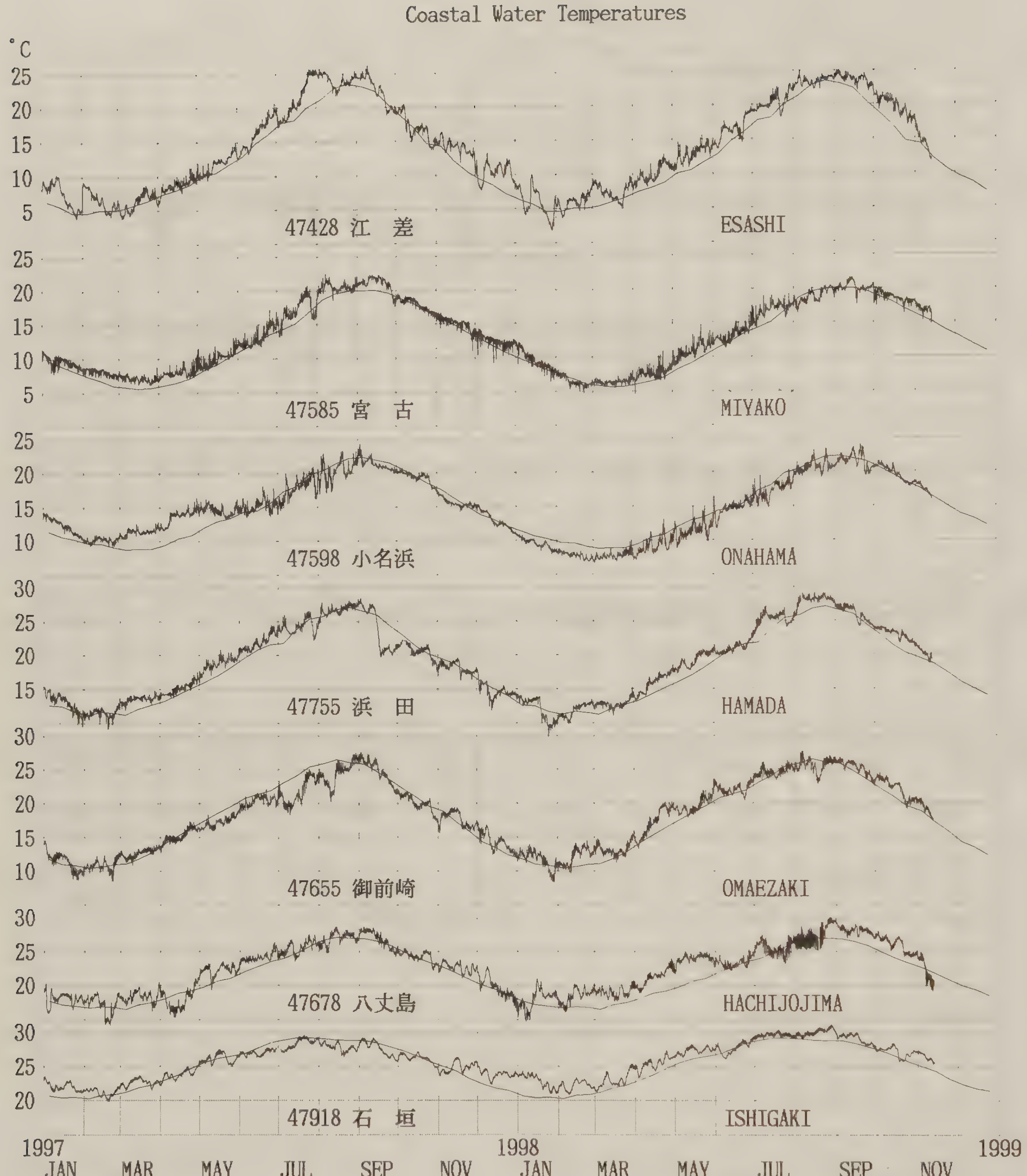
Time Series of Area Mean SST in the Western North Pacific



第12図　海域別旬平均海面水温平年偏差時系列図（つづき）

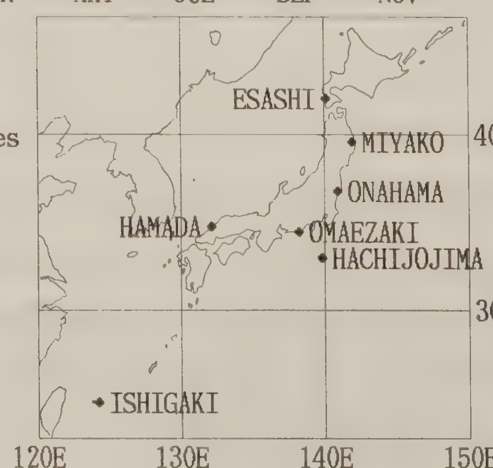
Fig.12 (continue) Time series of the ten-day mean sea surface temperature anomalies (°C) in the western North Pacific for the areas shown in the right panel. Negative anomalies are shaded. Anomalies are computed from the JMA climatology (1961-90).



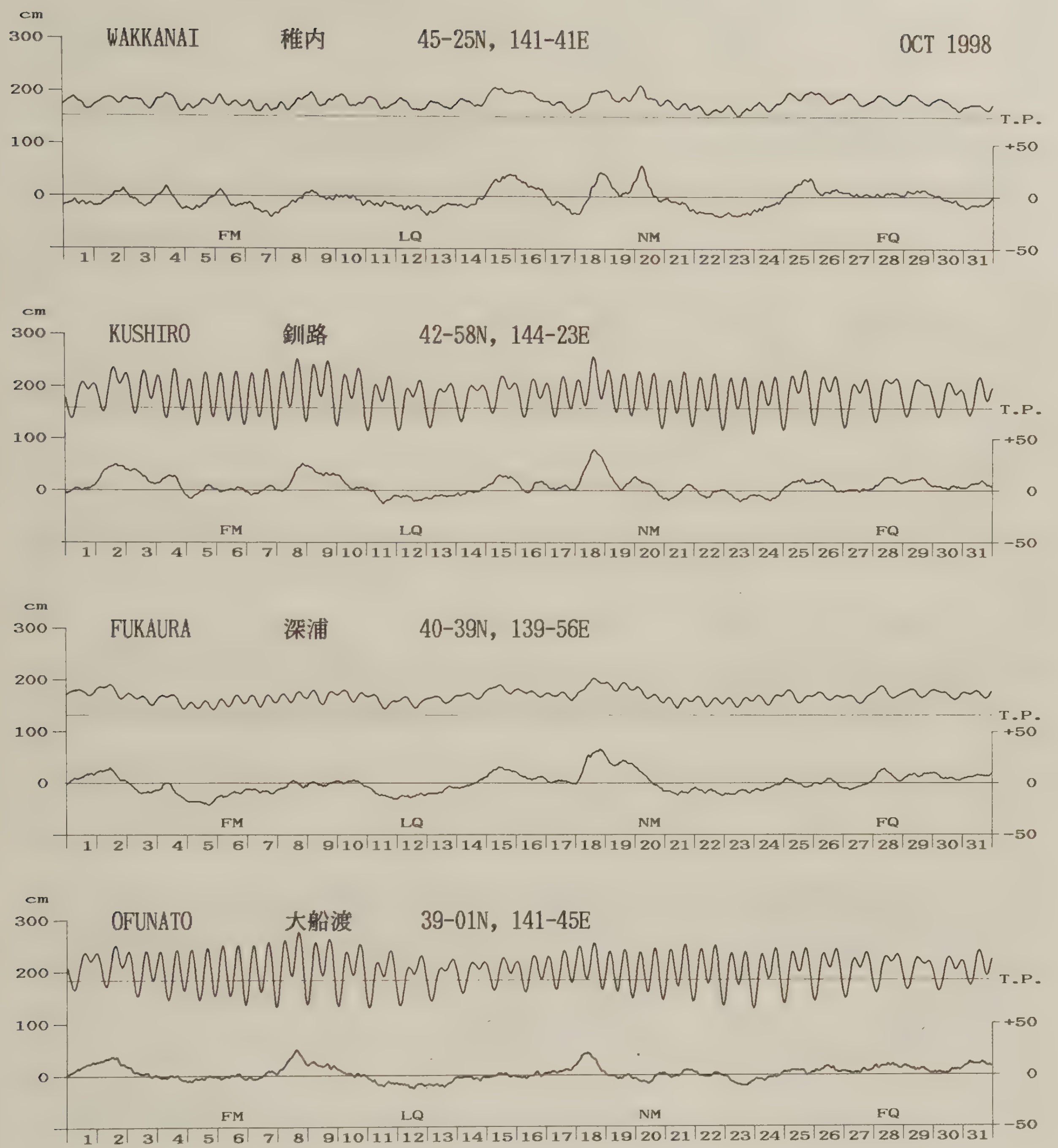


第13図 沿岸水温時系列図

Fig.13 Time series of hourly coastal water temperatures (°C) measured at 7 coastal stations of the JMA shown in the right panel.
Thin lines show ten-day mean climatology.



Time Series of Sea Level



第14図 沿岸潮位時系列図（1998年10月）

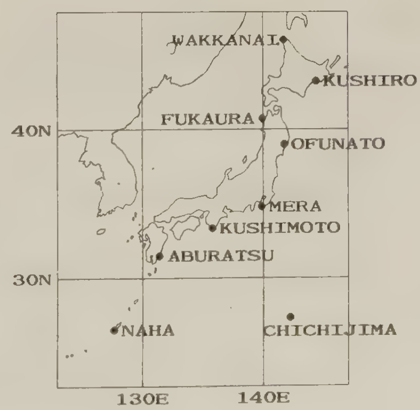
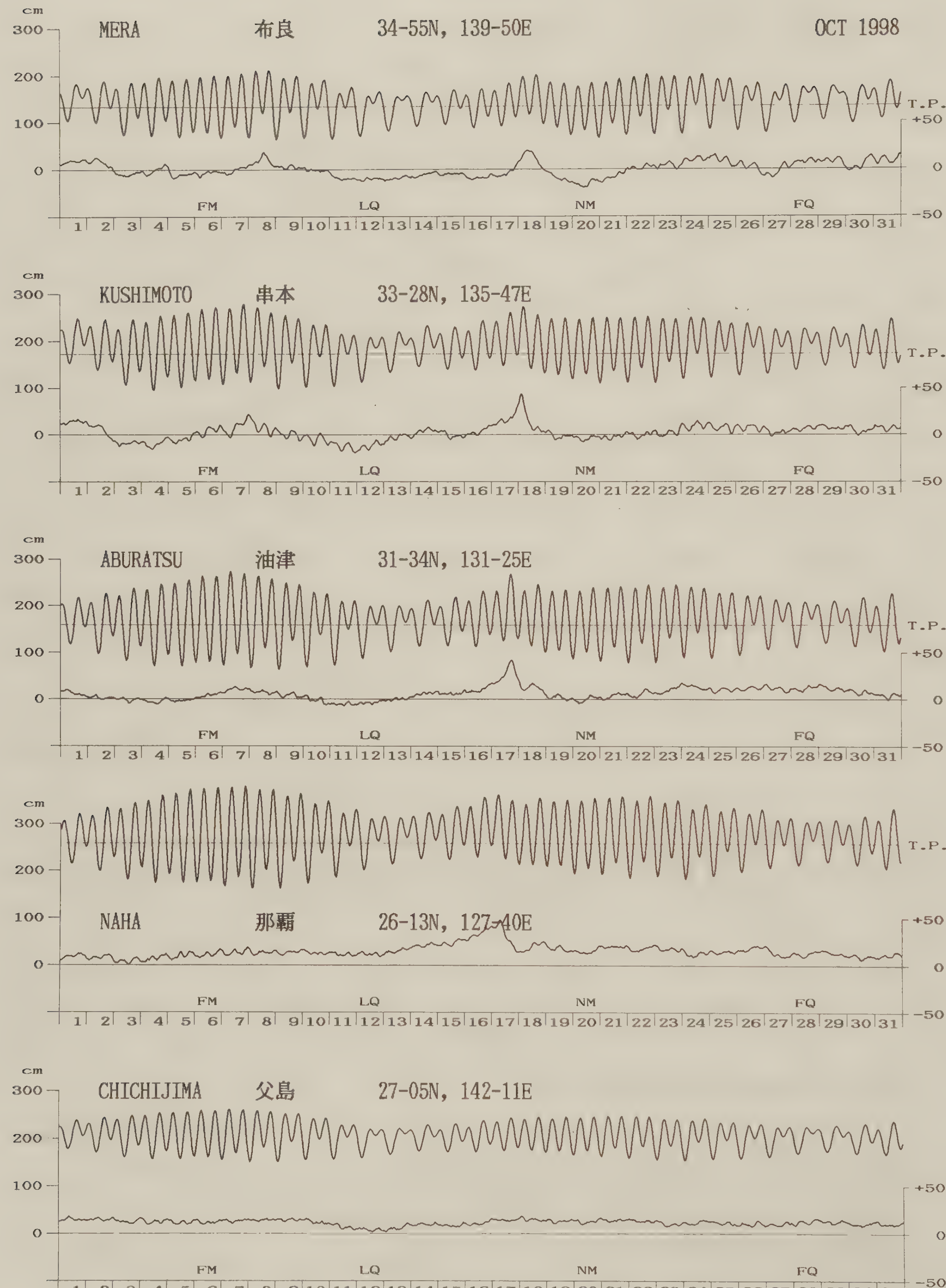


Fig.14 Time series of hourly sea level observation (upper line) and its anomalies (lower line) at 9 stations of the JMA in the right panel.
Short term variations are removed from raw data.

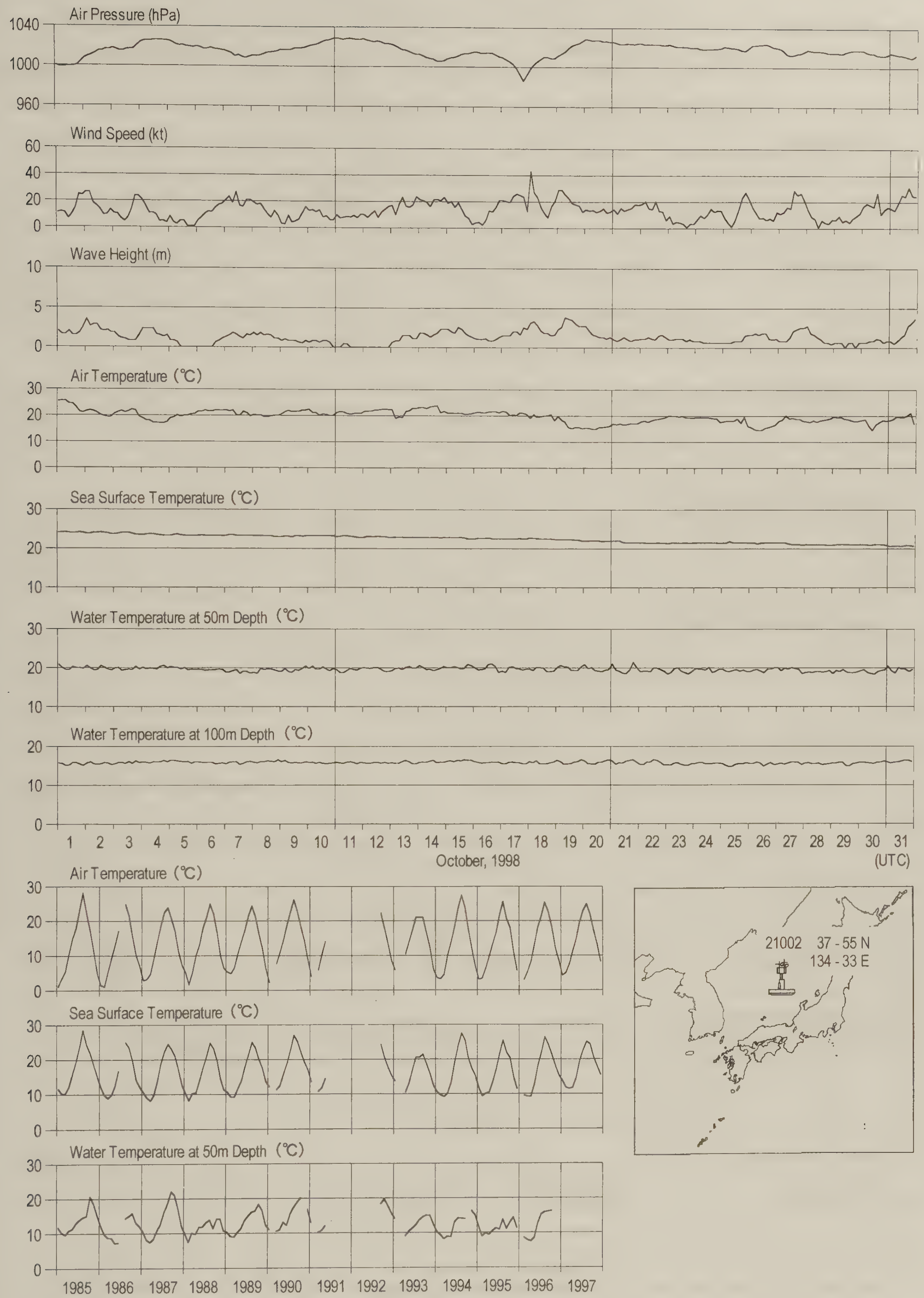
FM: full moon, FQ: first quarter
NM: new moon, LQ: last quarter
T.P.: Mean sea level of Tokyo Bay (Tokyo Peil)



第14図 つづき

Fig.14 continue

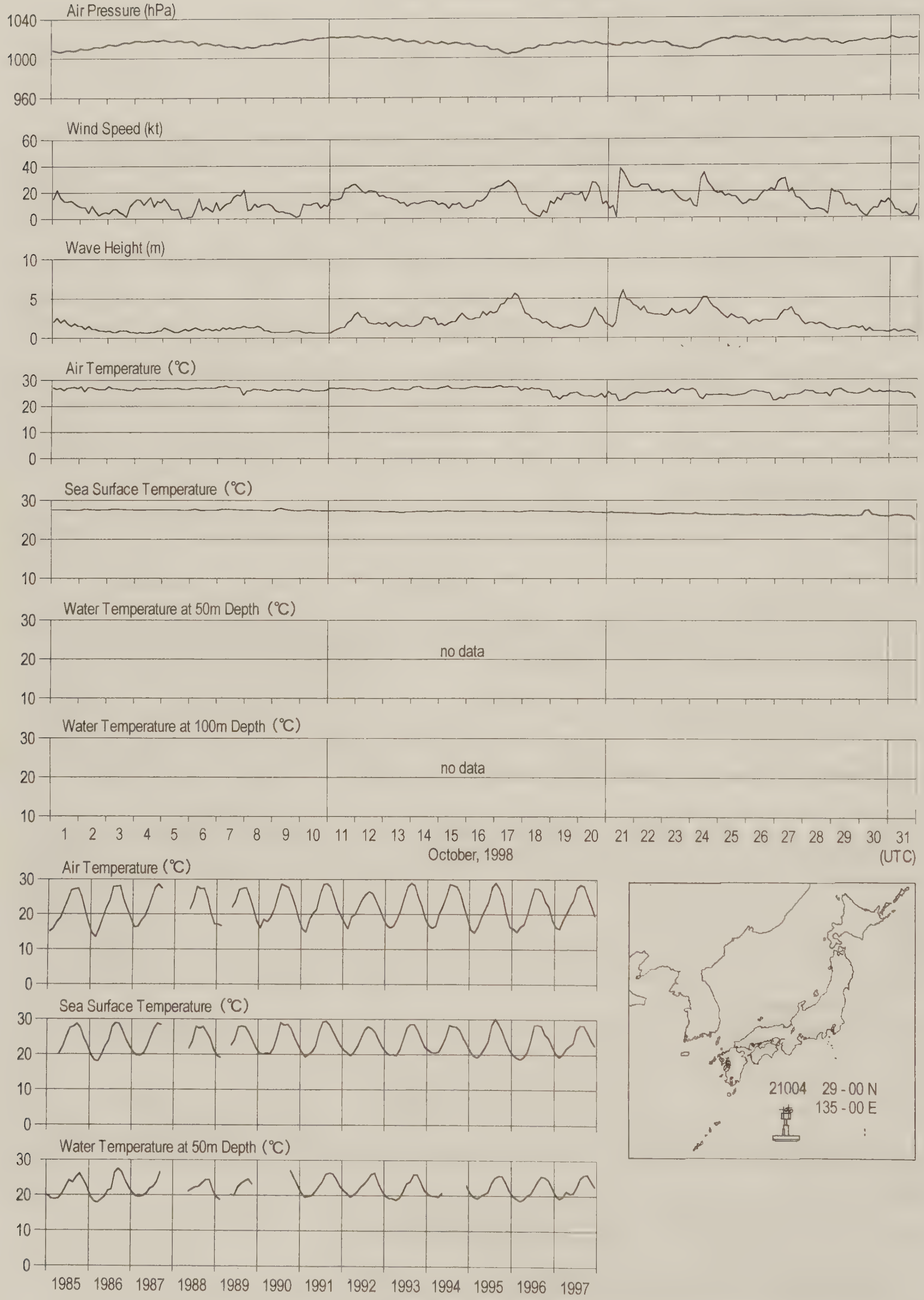
Ocean Data Buoy Observations



第15図　海洋気象ブイロボットによる観測要素の時系列図（日本海：21002）
上段は３時間毎の観測値を、下段は月平均値を示す。

Fig. 15　Time series of JMA buoy observation in the Japan Sea (WMO ID No. 21002). The upper panel shows three hourly observation and the lower panel shows the monthly mean data.

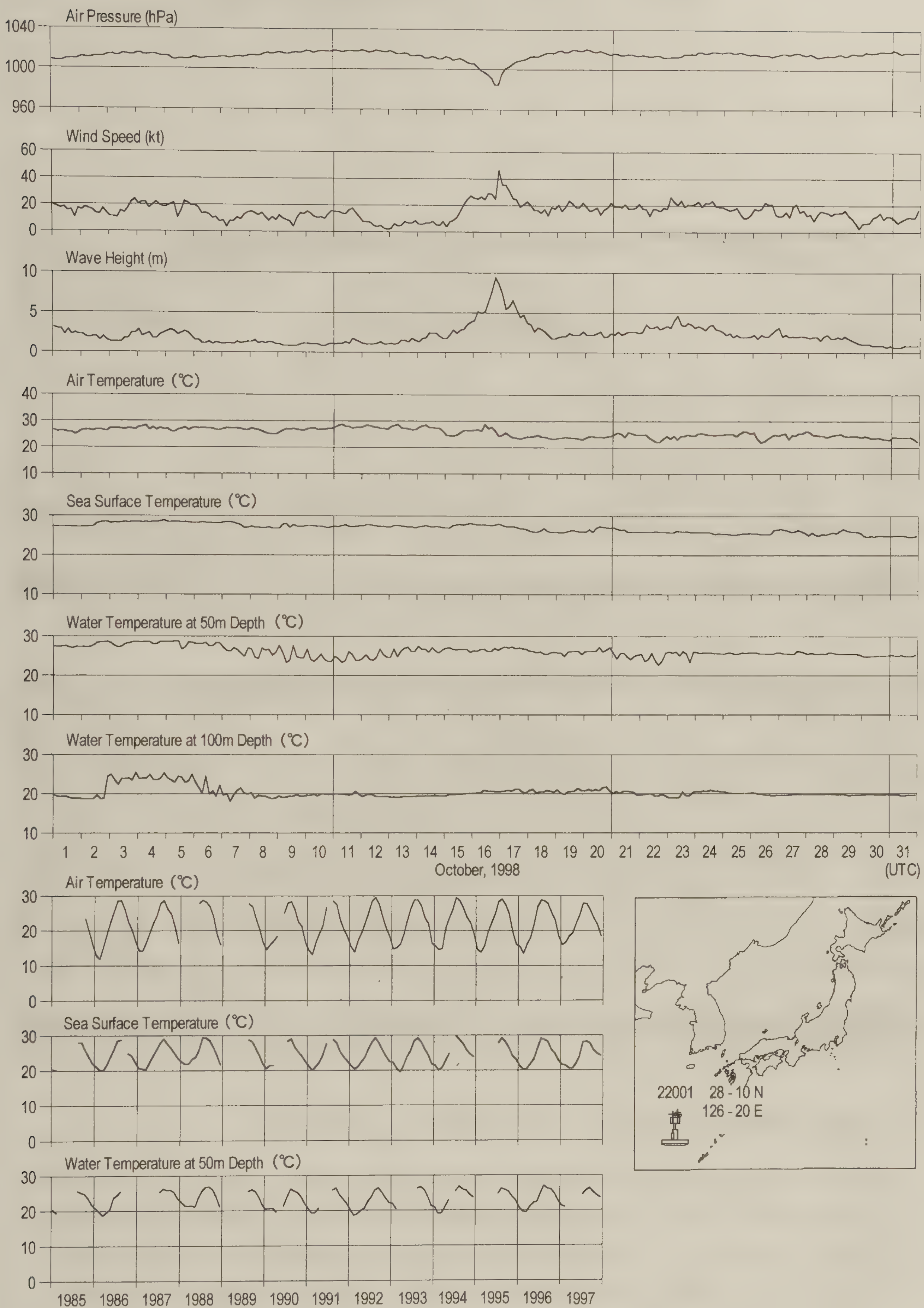
Ocean Data Buoy Observations



第15図　海洋気象ブイロボットによる観測要素の時系列図（四国沖：21004）
上段は３時間毎の観測値を、下段は月平均値を示す。

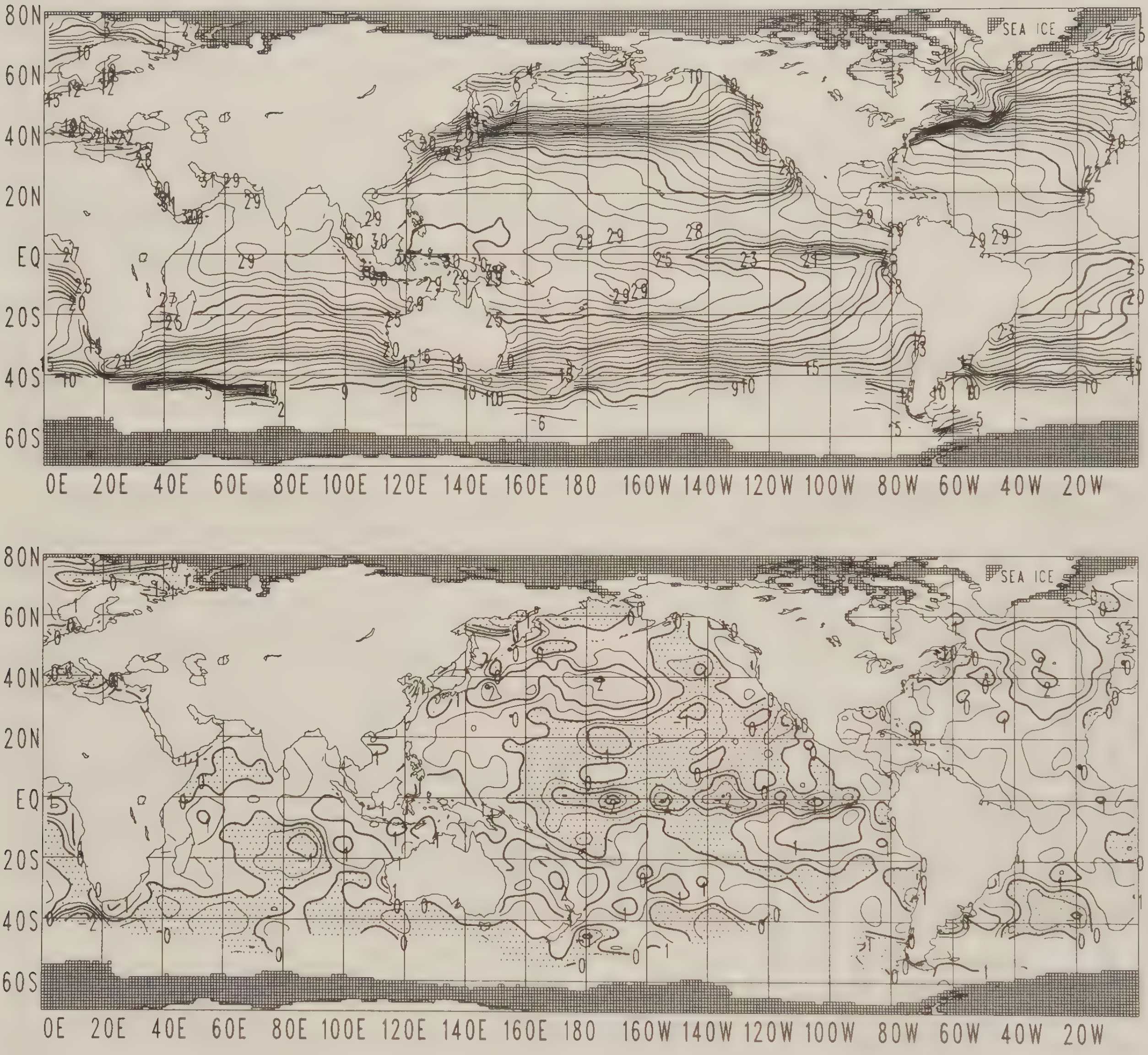
Fig. 15　Time series of JMA buoy observation south of Shikoku (WMO ID No. 21004). The upper panel shows three hourly observation and the lower panel shows the monthly mean data.

Ocean Data Buoy Observations



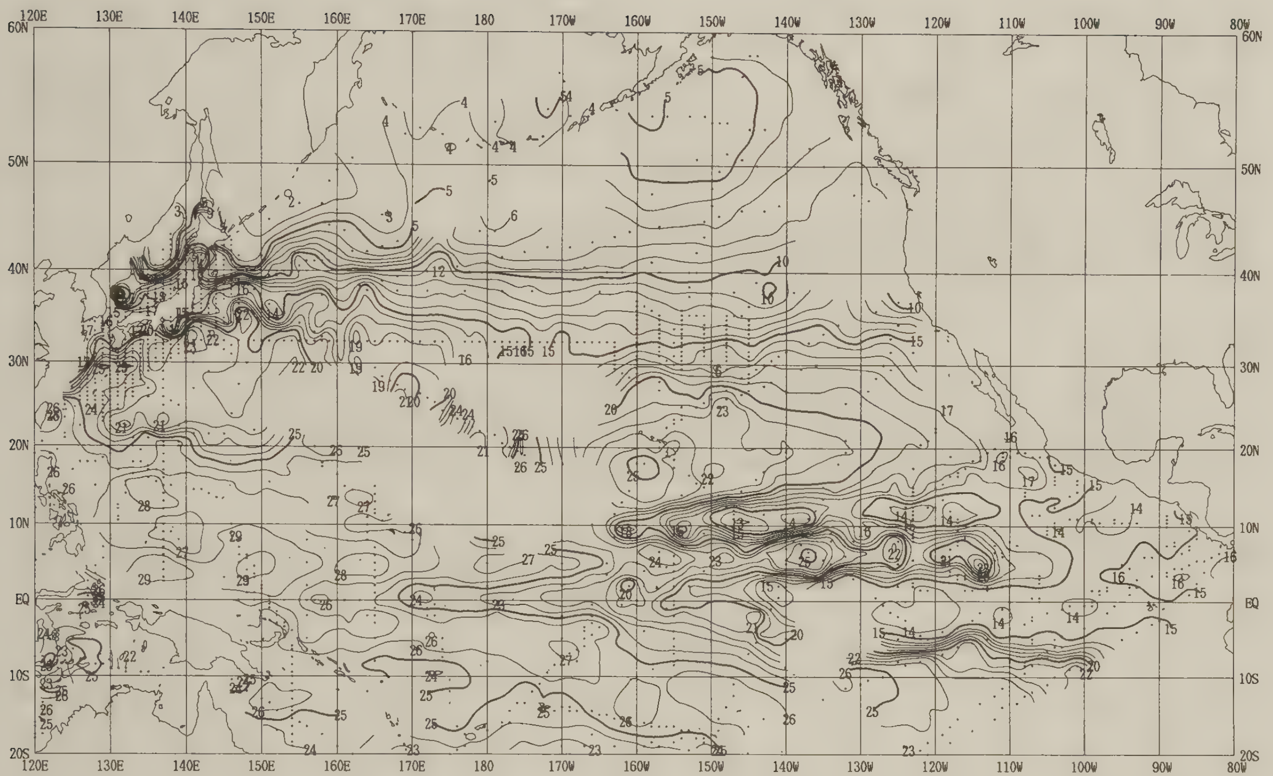
第15図　海洋気象ブイロボットによる観測要素の時系列図（東シナ海：22001）
上段は３時間毎の観測値を、下段は月平均値を示す。

Fig. 15　Time series of JMA buoy observation in the East China Sea (WMO ID No. 22001). The upper panel shows three hourly observation and the lower panel shows the monthly mean data.



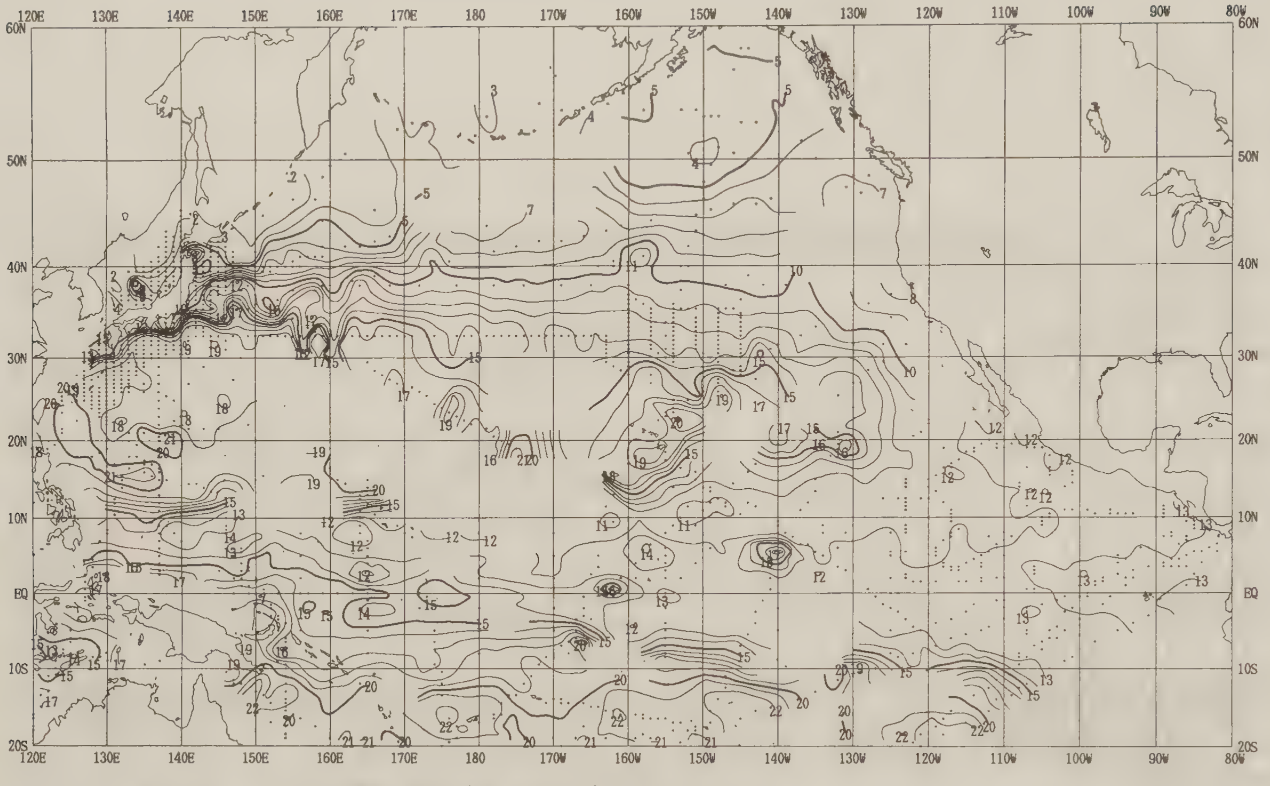
第16図　全球月平均海面水温図（上）及び偏差図（下）（1998年10月）

Fig.16 Monthly mean sea surface temperature over the global ocean (top) and anomalies (bottom) for OCT 1998. Anomalies are computed from the JMA climatology (1961-1990). Contour interval is 1°C (top) and additional anomaly contours of ±0.5°C are shown by thin lines. Negative anomalies are spotted. Maximum coverage of sea ice is shaded. Data sources for sea ice are U.S. National Ice Center (polar regions) and JMA (the Sea of Okhotsk).



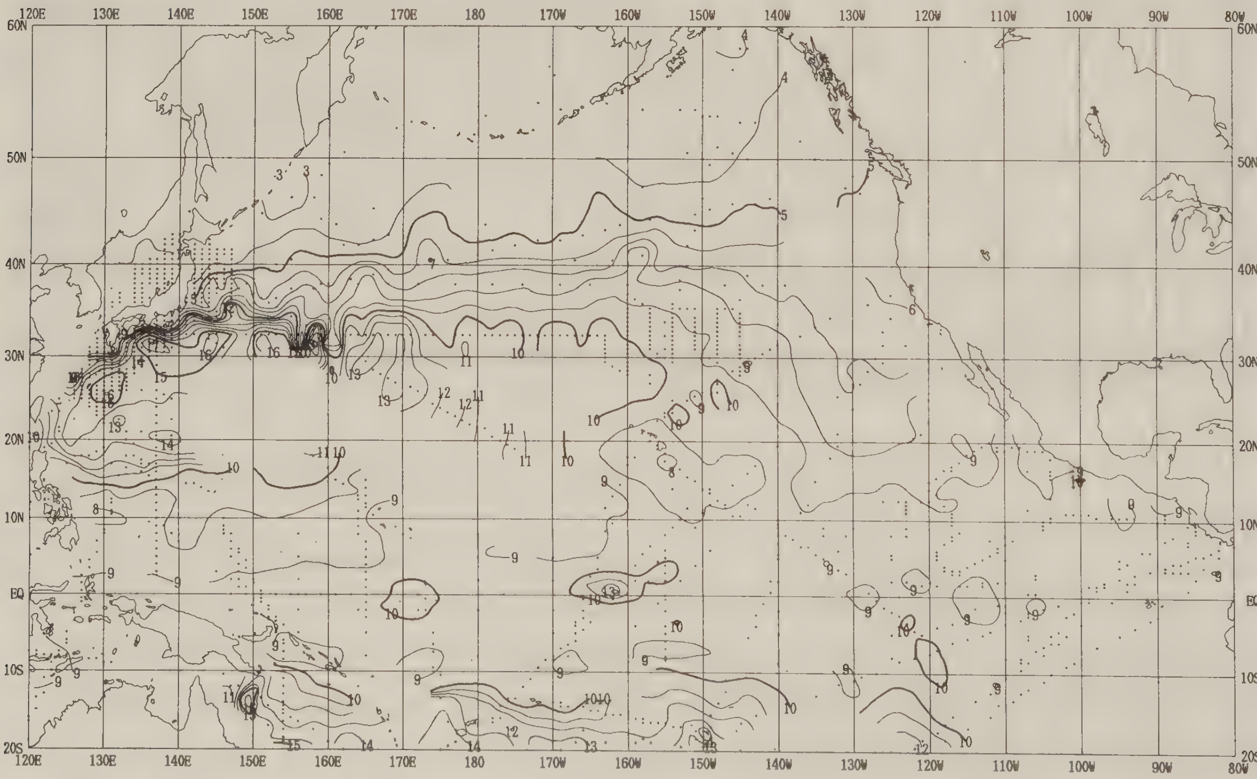
第17図　太平洋表層水温図(深さ100m) (1998年10月)

Fig.17 Subsurface (100m) temperatures in the Pacific Ocean for OCT 1998. Contour interval is 1°C. Observation points are denoted by dots.



第18図　太平洋表層水温図(深さ200m)(1998年10月)

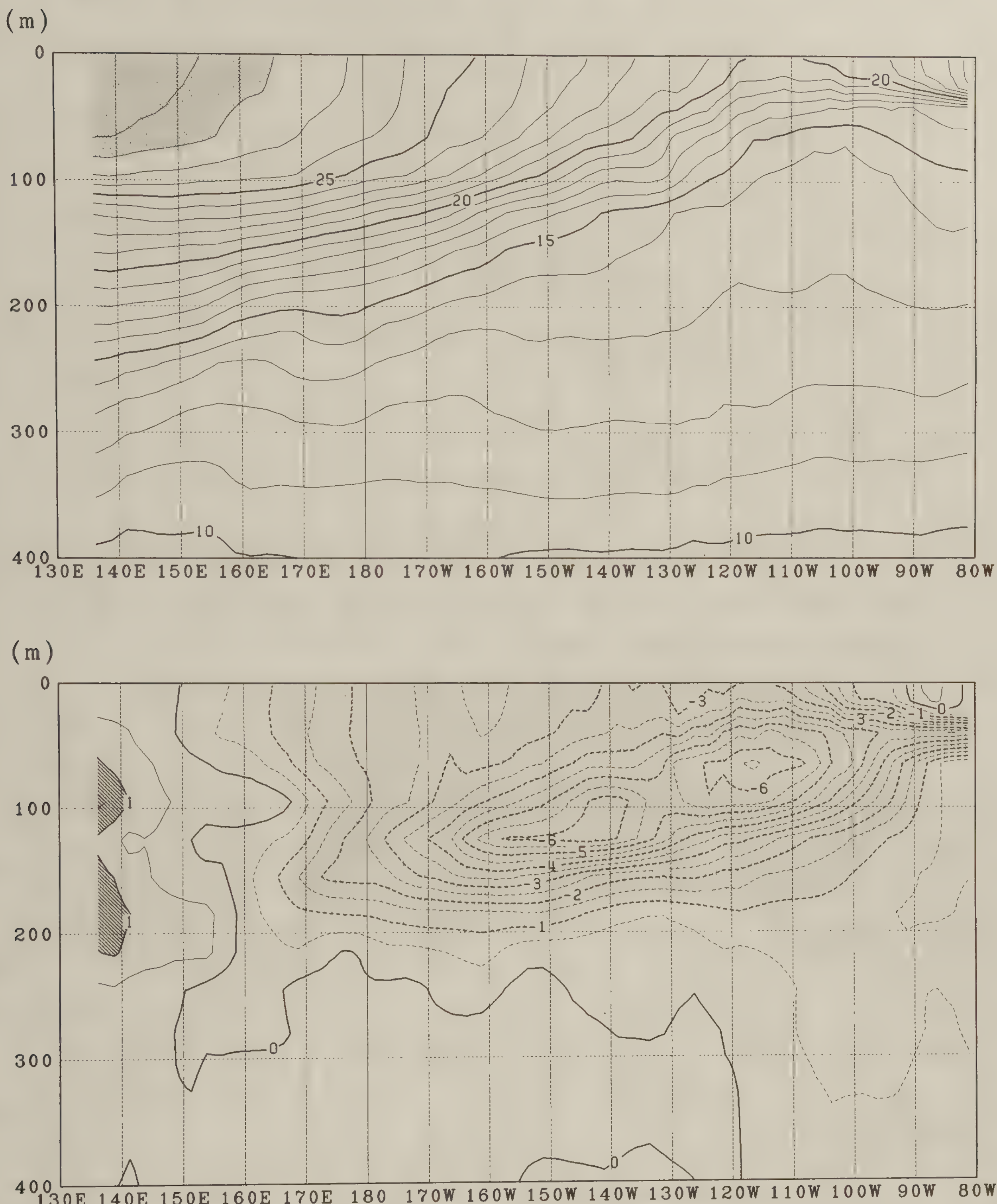
Fig.18　Subsurface (200m) temperatures in the Pacific Ocean for OCT 1998.
Contour interval is 1°C.　Observation points are denoted by dots.



第19図　太平洋表層水温図(深さ400m)(1998年10月)

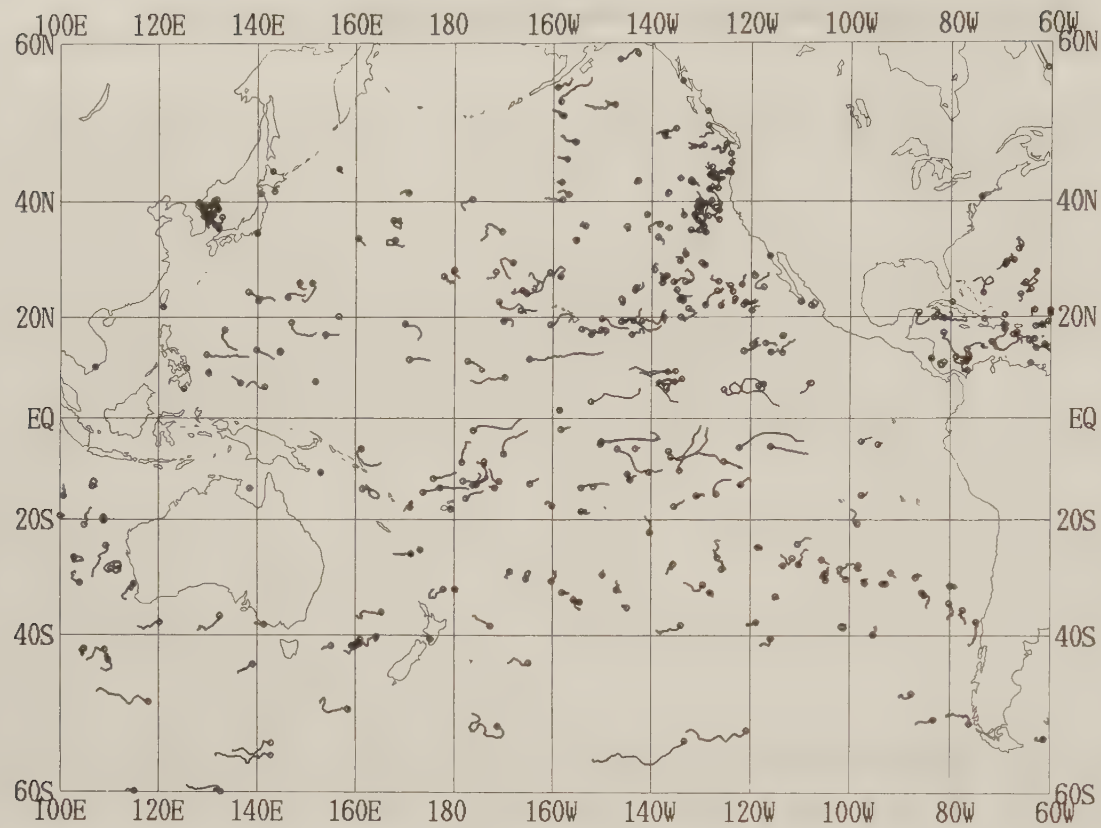
Fig.19　Subsurface (400m) temperatures in the Pacific Ocean for OCT 1998.
Contour interval is 1°C.　Observation points are denoted by dots.

Depth-Longitude Sections of Equatorial Temperature & Anomalies



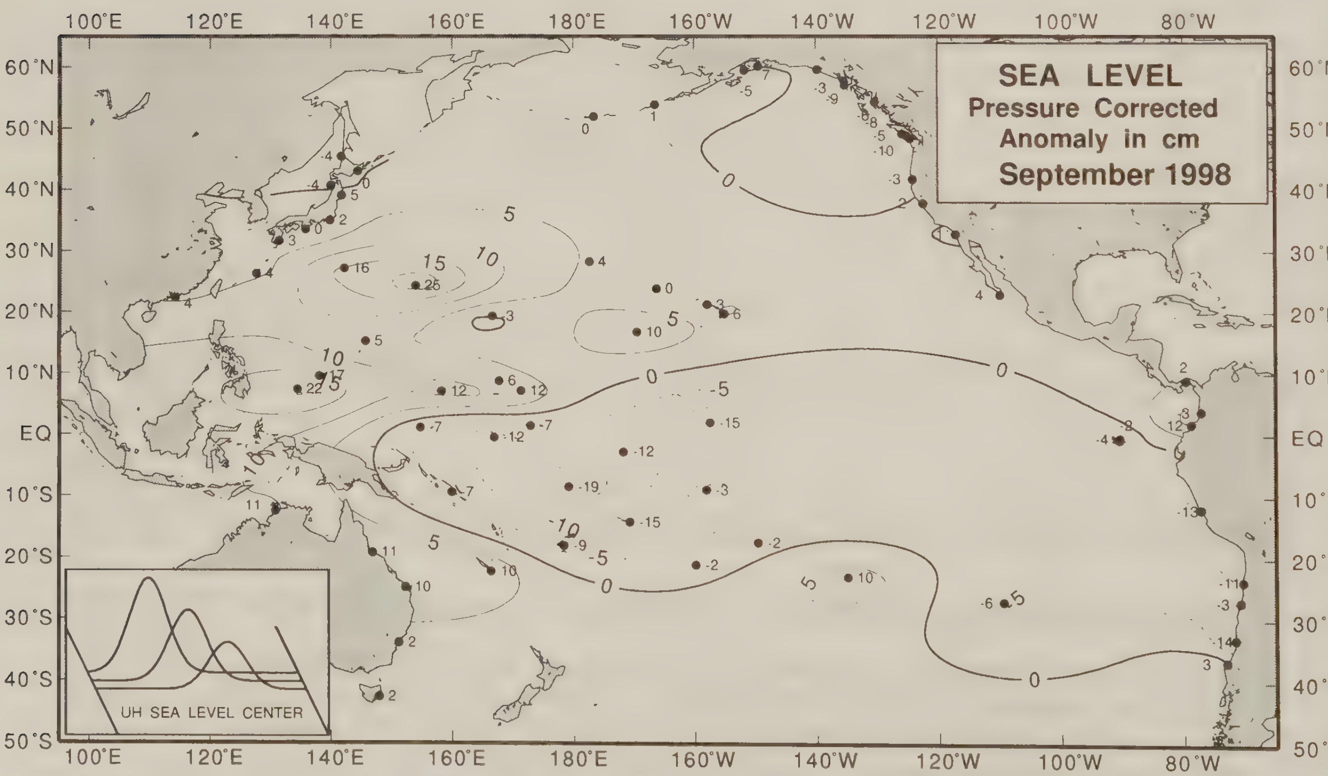
第20図　太平洋赤道に沿う表層水温（上）及び偏差（下）の深度－経度断面図（1998年10月）

Fig.20 Depth-longitude sections of temperature (top) and anomalies (bottom) along the equator in the Pacific Ocean for OCT 1998. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (top) and 0.5°C (bottom). Values greater than 28°C in the top panel are shaded. In the bottom panel, values greater than 1°C are shaded and values less than -1°C are spotted. Anomalies are computed from 1987-1997 base period means.



第21図　太平洋ブイ流跡図(1998年10月)

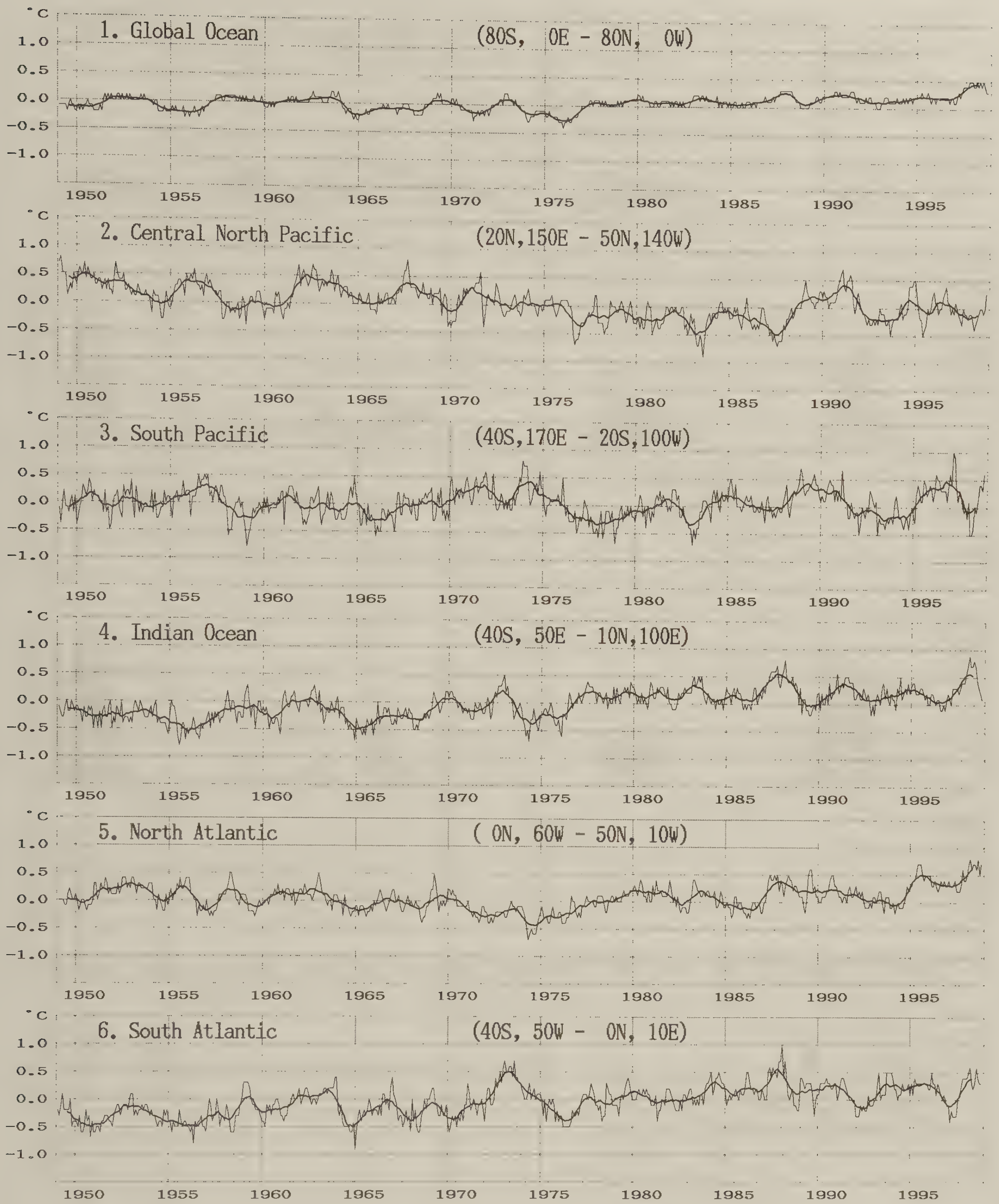
Fig.21　Movements of drifting buoys in the Pacific Ocean during OCT 1998.
Each track is for one buoy. Small circles represent last positions for the month.



第22図　太平洋海面水位偏差図 (1998年 9月)

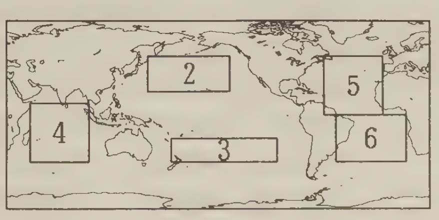
Fig.22　Monthly sea level anomalies for SEP 1998 obtained from mean sea level (1975-1995) adjusted for atmospheric pressure. This figure is prepared by the SOC of ISLP-PAC, Dept. of Oceanography, Univ. of Hawaii.

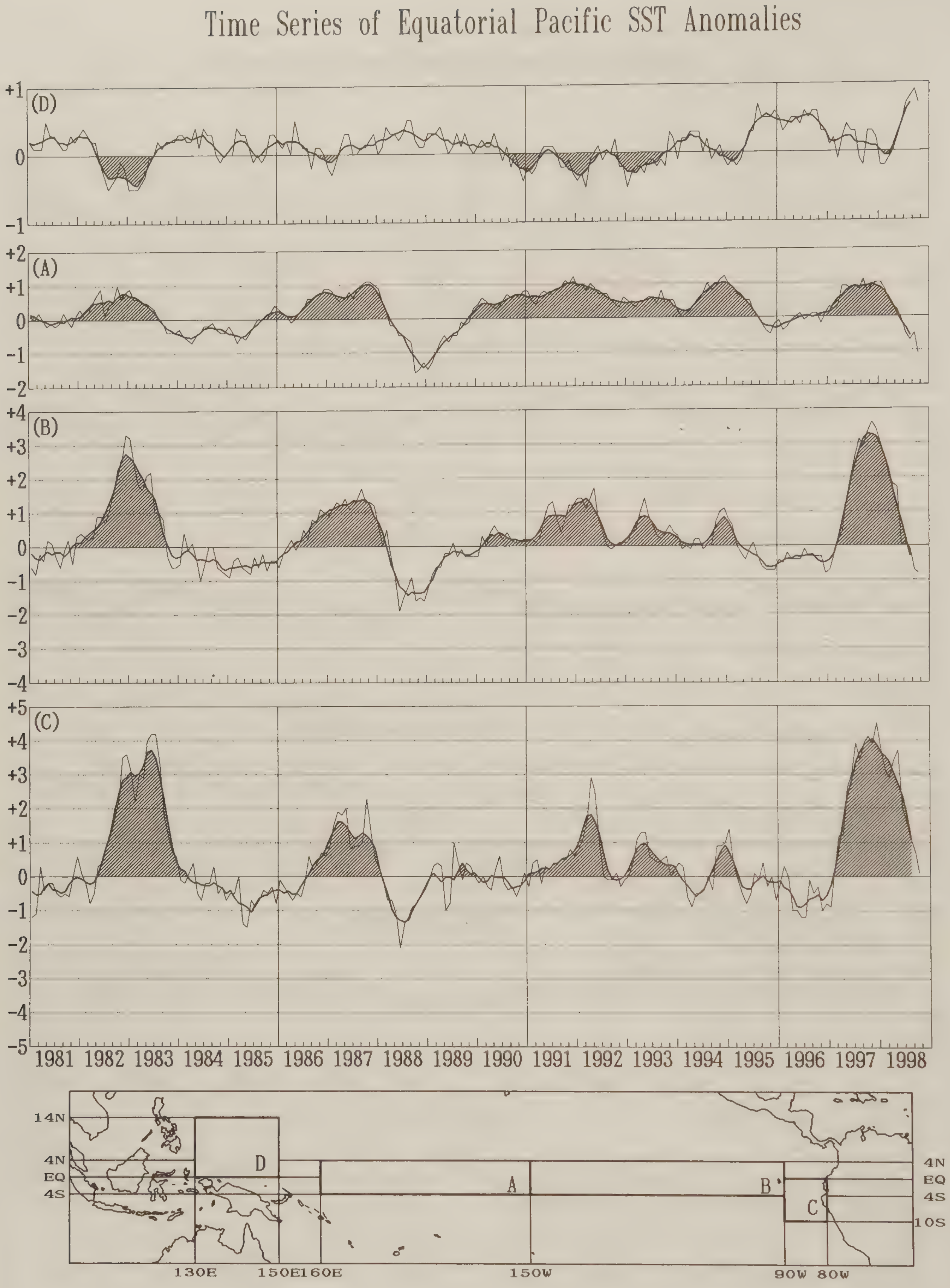
Long-term Variation of Monthly Mean SST Anomalies



第23図 海域平均海面水温偏差の長期変動

Fig.23 Long-term variations of monthly mean sea surface temperature anomalies (°C) for the areas shown in the right panel. Anomalies are computed from the JMA climatology (1961-90). Thin lines show the monthly mean and thick lines their 13-month running means.





第24図　太平洋赤道域の海面水温偏差時系列図

Fig.24 Time series of monthly mean SST anomalies (°C) in the equatorial Pacific Ocean for the areas indicated at the bottom panel. Thin lines show the monthly means and thick lines their 5-month running means. Positive anomalies (A, B, C) and negative anomalies (D) are shaded. Anomalies are computed from the JMA climatology (1961-1990).

El Nino Monitoring Indices

MONTH	REGION D 14N-EQ 130E-150E SST	REGION D anomaly	REGION A 4N-4S 160E-150W SST	REGION A anomaly	REGION B 4N-4S 150W-90W SST	REGION B anomaly	REGION C EQ-10S 90W-80W SST	REGION C anomaly	SOI	TAHITI 17-33S 149-37W	DARWIN 12-24S 130-52E
	SEA SURFACE TEMPERATURE AND ANOMALY (°C)								SOI	SEA LEVEL PRESSURE ANOMALY (hPa)	
JAN 96	29.0	0.5	27.9	-0.1	25.0	-0.4	24.1	-0.2	0.8	1.0	-0.7
FEB 96	28.6	0.3	27.6	-0.4	25.7	-0.5	26.0	0.3	0.1	-0.2	-0.5
MAR 96	28.8	0.4	27.8	-0.3	26.7	-0.2	25.9	0.0	0.7	1.0	-0.3
APR 96	29.3	0.5	28.1	-0.1	26.7	-0.4	24.1	-1.0	0.8	0.5	-0.5
MAY 96	29.6	0.5	28.5	0.0	26.2	-0.4	22.9	-1.0	0.3	1.2	1.2
JUN 96	29.7	0.4	28.6	0.1	25.7	-0.4	21.5	-1.2	1.4	1.6	-0.2
JUL 96	29.8	0.6	28.4	-0.1	25.1	-0.1	20.4	-1.2	0.7	0.6	-0.6
AUG 96	29.6	0.5	28.4	0.0	24.3	-0.3	20.5	-0.1	0.4	0.4	-0.3
SEP 96	29.8	0.6	28.4	0.1	24.3	-0.3	19.8	-0.5	0.5	-0.7	-1.7
OCT 96	29.9	0.6	28.5	0.1	24.3	-0.3	20.4	-0.3	0.4	-0.1	-0.8
NOV 96	29.5	0.3	28.2	-0.2	24.3	-0.3	20.5	-1.0	-0.0	-0.5	-0.5
DEC 96	29.2	0.3	28.3	0.1	24.1	-0.8	21.8	-0.8	0.8	-0.3	-1.9
JAN 97	28.6	0.1	28.3	0.3	24.7	-0.7	23.4	-0.9	0.3	1.7	0.9
FEB 97	28.5	0.2	28.2	0.2	25.9	-0.3	25.9	0.2	1.2	1.0	-1.9
MAR 97	28.3	-0.1	28.4	0.3	27.0	0.1	27.1	1.2	-0.6	-0.5	0.9
APR 97	29.0	0.2	29.1	0.9	27.5	0.4	26.3	1.2	-1.1	0.4	2.3
MAY 97	29.5	0.4	29.4	0.9	27.9	1.3	26.5	2.6	-2.5	-2.1	0.9
JUN 97	29.6	0.3	29.3	0.8	28.1	2.0	25.7	3.0	-2.3	-0.8	2.1
JUL 97	29.5	0.3	29.4	0.9	27.8	2.6	25.5	3.9	-0.8	-0.1	1.2
AUG 97	29.0	-0.1	29.2	0.8	27.7	3.1	24.0	3.4	-2.0	-0.9	2.2
SEP 97	29.0	-0.2	29.4	1.1	27.5	2.9	24.2	3.9	-1.4	0.1	2.7
OCT 97	29.6	0.3	29.1	0.7	27.9	3.3	24.8	4.1	-1.6	-0.2	2.7
NOV 97	29.5	0.3	29.3	0.9	28.2	3.6	25.4	3.9	-1.2	0.4	2.7
DEC 97	29.1	0.2	29.2	1.0	28.3	3.4	27.1	4.5	-0.9	-0.5	1.1
JAN 98	28.3	-0.2	29.0	1.0	28.4	3.0	28.0	3.7	-2.3	-3.6	1.4
FEB 98	28.1	-0.2	28.8	0.8	28.8	2.6	28.8	3.1	-1.8	-0.9	3.5
MAR 98	28.3	-0.1	28.6	0.5	29.0	2.1	28.8	2.9	-2.5	-2.8	2.3
APR 98	28.8	0.0	28.5	0.3	28.9	1.8	28.5	3.4	-2.3	-1.5	1.4
MAY 98	29.3	0.2	28.7	0.2	28.3	1.7	27.6	3.7	0.0	0.4	0.5
JUN 98	29.7	0.4	28.4	-0.1	26.1	0.0	24.7	2.0	1.1	0.9	-0.5
JUL 98	29.9	0.7	28.0	-0.5	25.3	0.1	23.2	1.6	1.5	1.8	-0.6
AUG 98	29.9	0.8	27.7	-0.7	24.5	-0.1	21.7	1.1	1.0	1.4	-0.2
SEP 98	30.1	0.9	27.8	-0.5	23.9	-0.7	21.0	0.7	1.0	1.4	-0.4
OCT 98	30.0	0.7	27.3	-1.1	23.8	-0.8	20.8	0.1	1.2	0.8	-1.1

第1表　エルニーニョ監視指数

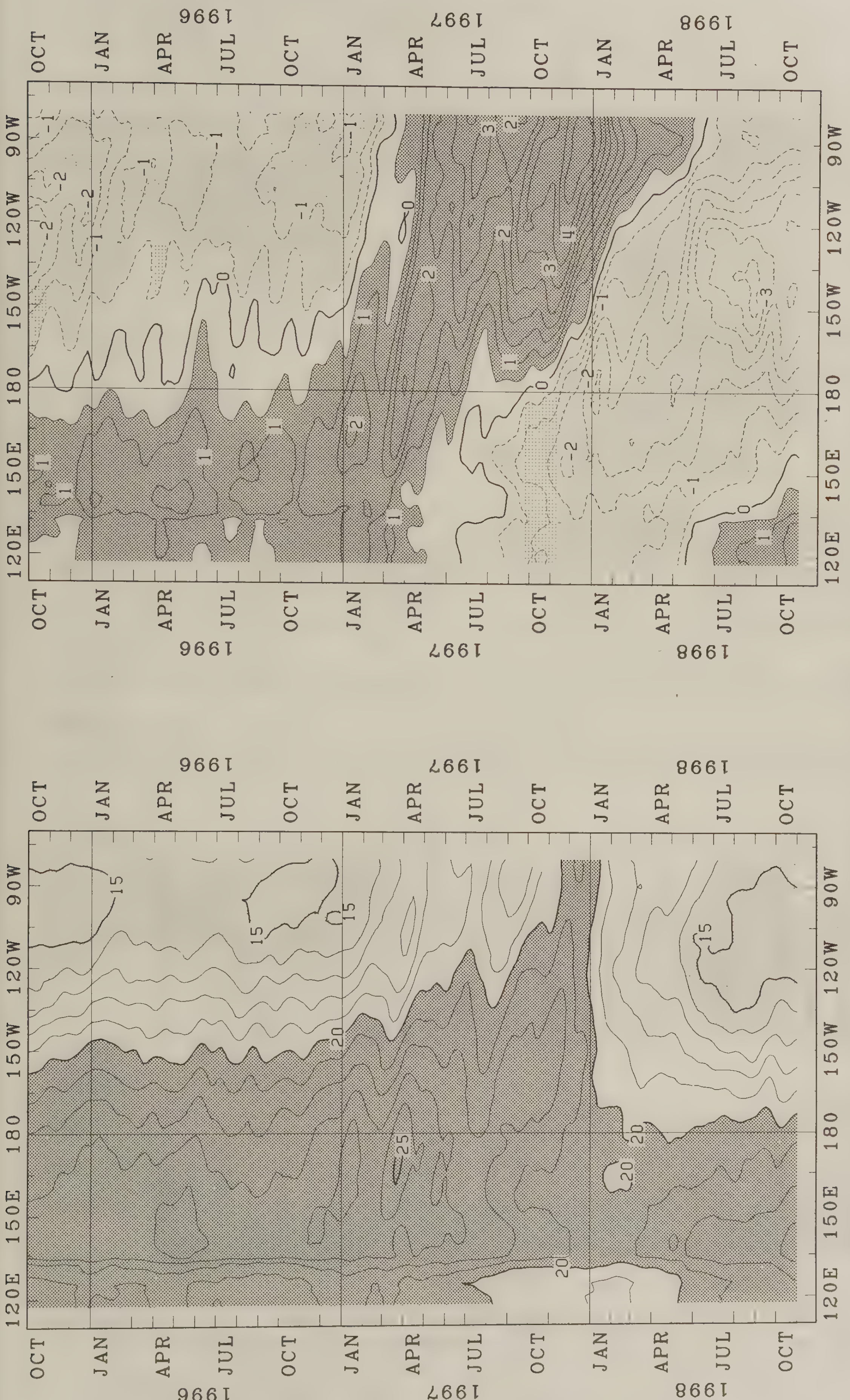
Table 1 El Nino Monitoring indices



第25図　赤道に沿った海面水温（左）および偏差（右）の時間-経度断面図

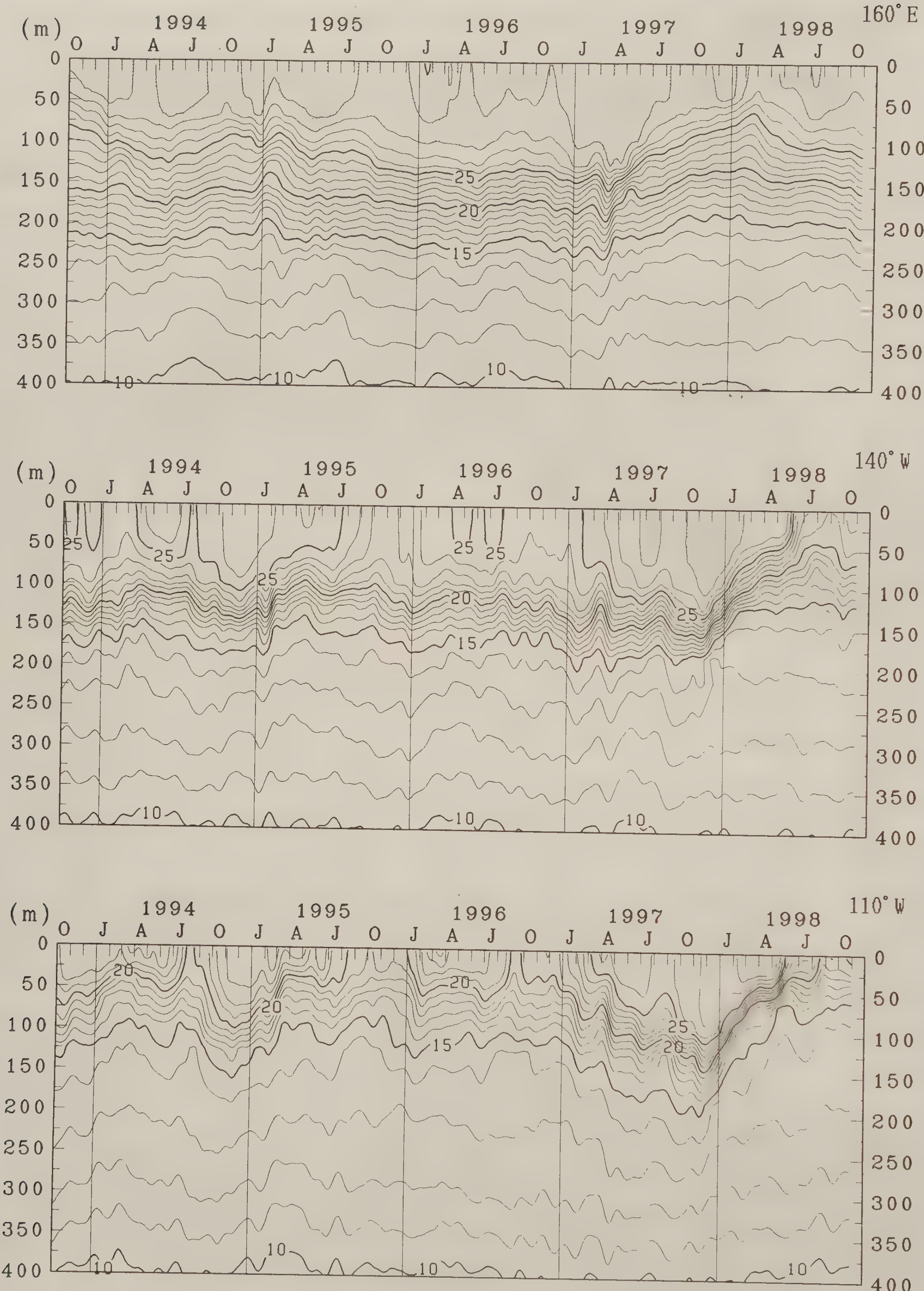
Fig.25　Time-longitude sections of SSTs (left) and anomalies (right) along the equator (2°N-2°S) in the global ocean. Contour interval is 1°C (left) and 0.5°C (right). Values greater than 28°C are shaded and values less than 23°C are spotted in the left panel. Dashed contours indicate negative anomalies in the right panel. Anomalies are computed from 1961-1990 base period means.

Time-Longitude Sections of Ocean Heat Content & Anomalies (Eq.)



第26図　太平洋の赤道に沿う海洋表層の貯熱量（左）及び偏差（右）の時間－経度断面図

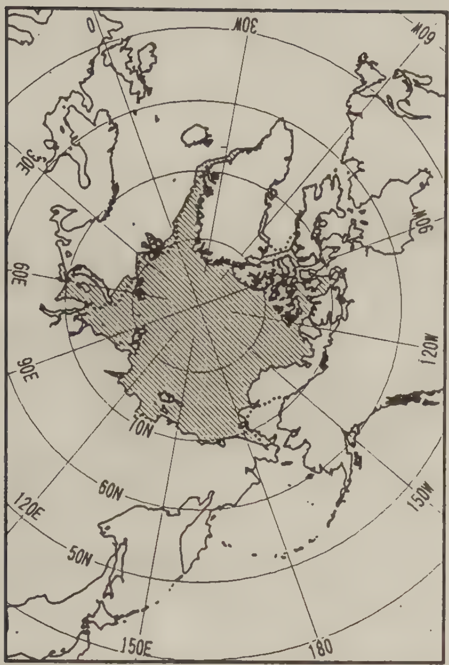
Fig.26 Time-longitude sections of ocean heat content in the upper 260m along the equator (left) and anomalies (right) in the Pacific Ocean. Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C (left) and 0.5°C (right). Values greater than 20°C are shaded and values less than 16°C are spotted in the left panel. Dashed contours indicate negative anomalies in the right panel. Anomalies are computed from 1987-1997 base period means.



第27図　太平洋赤道域の表層水温の時間－深度断面図

（上：西部、中：中部、下：東部）

Fig.27 Time-depth sections of equatorial subsurface temperature for the western Pacific (top, 160°E), the central Pacific (middle, 140°W) and the eastern Pacific (bottom, 110°W). Data are derived from the Ocean Data Assimilation System of JMA. Contour interval is 1°C. Values greater than 28°C are shaded.

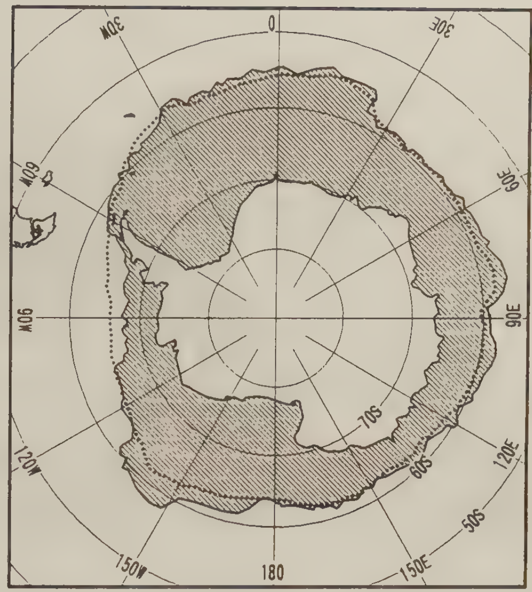


第28-1図 北極域の海氷図（1998年10月16日）

Fig.28-1 Sea ice chart in the Arctic on 16 Oct. 1998.

The shaded area represents the sea ice extent. The dotted line denotes the mean ice edge averaged for the period from 1972 through 1990.

The data source is the National Ice Center (USA).

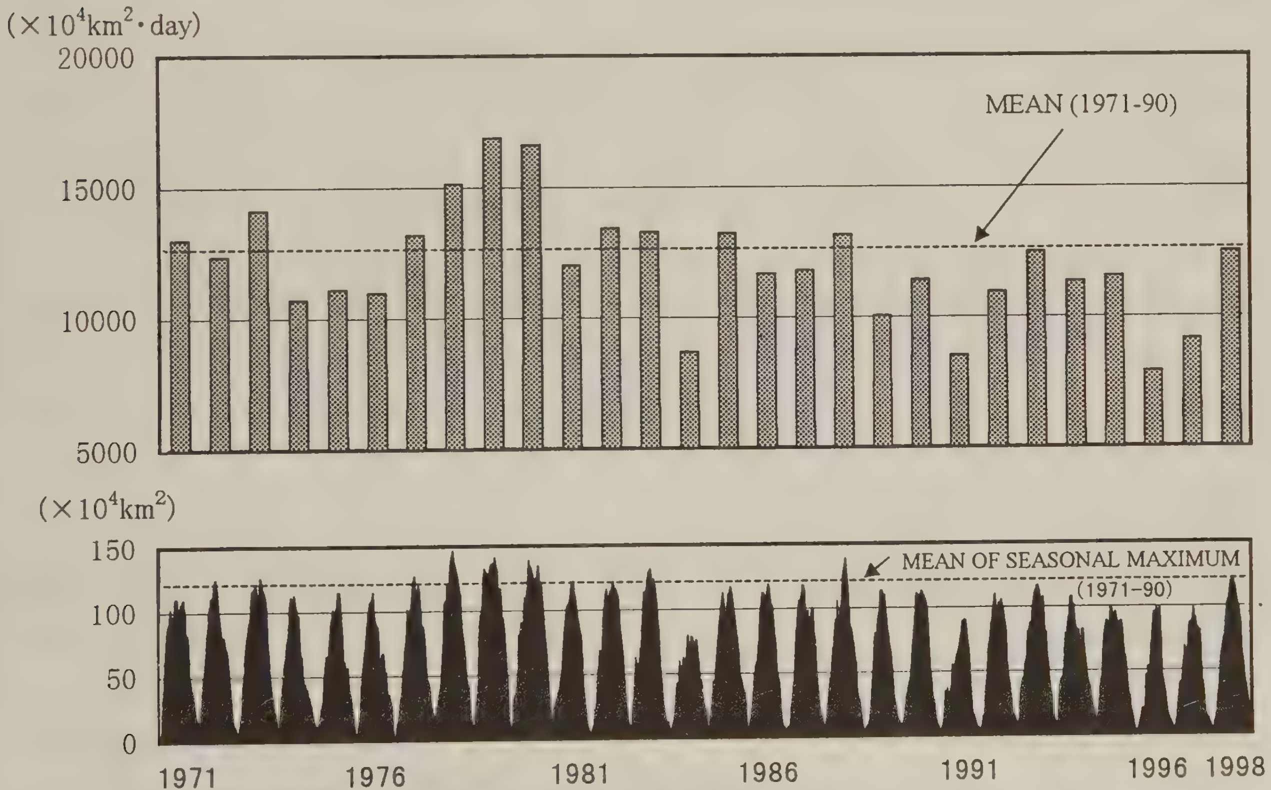


第28-2図 南極域の海氷図（1998年10月16日）

Fig.28-2 Sea ice chart in the Antarctic on 16 Oct. 1998.

The shaded area represents the sea ice extent. The dotted line denotes the mean ice edge averaged for the period from 1973 through 1990.

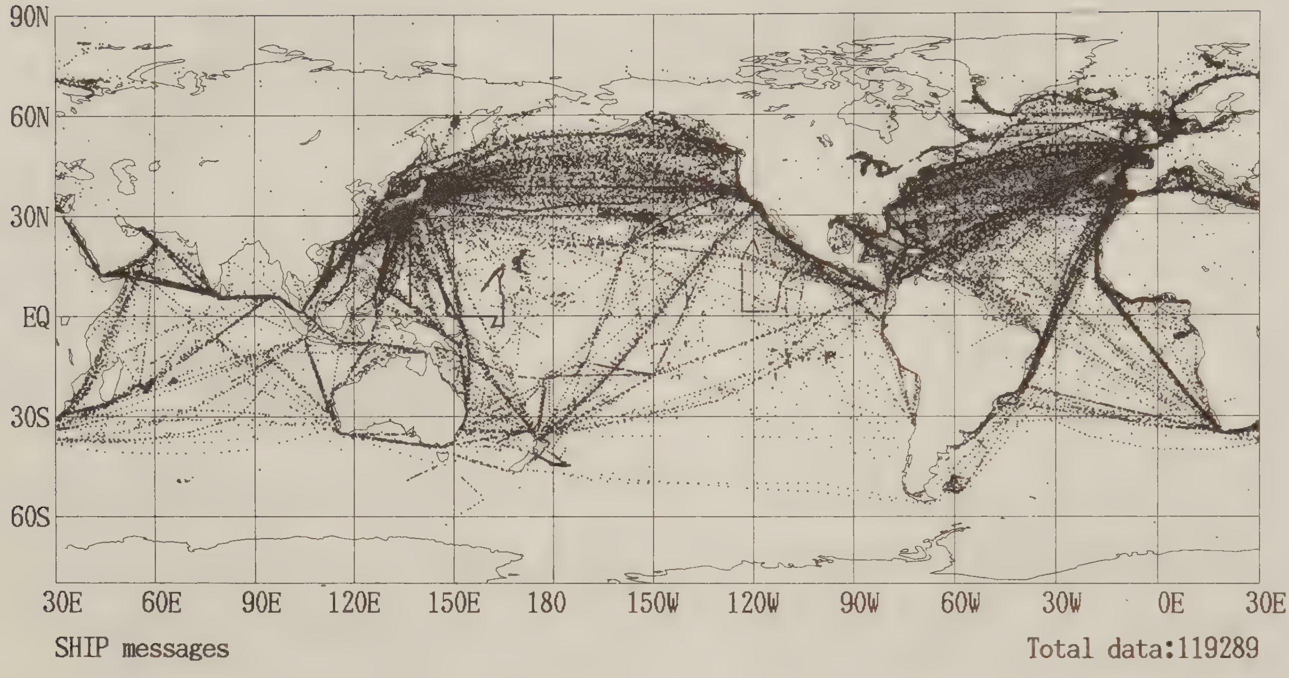
The data source is the National Ice Center (USA).

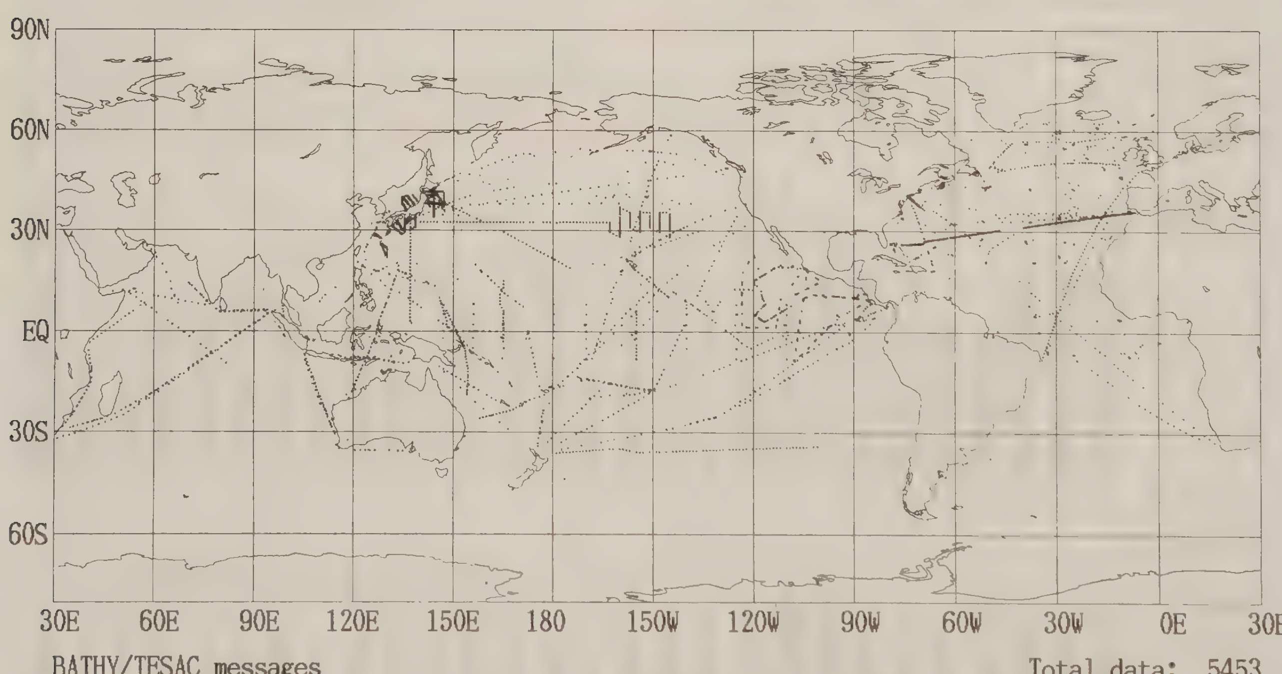


第28-3図 オホーツク海の海氷期の半旬海氷域面積（下段）とその積算（上段）の経年変化

Fig. 28-3 Time series of every five day's sea ice extent from December to May (lower) and its summation (upper) in the Sea of Okhotsk.

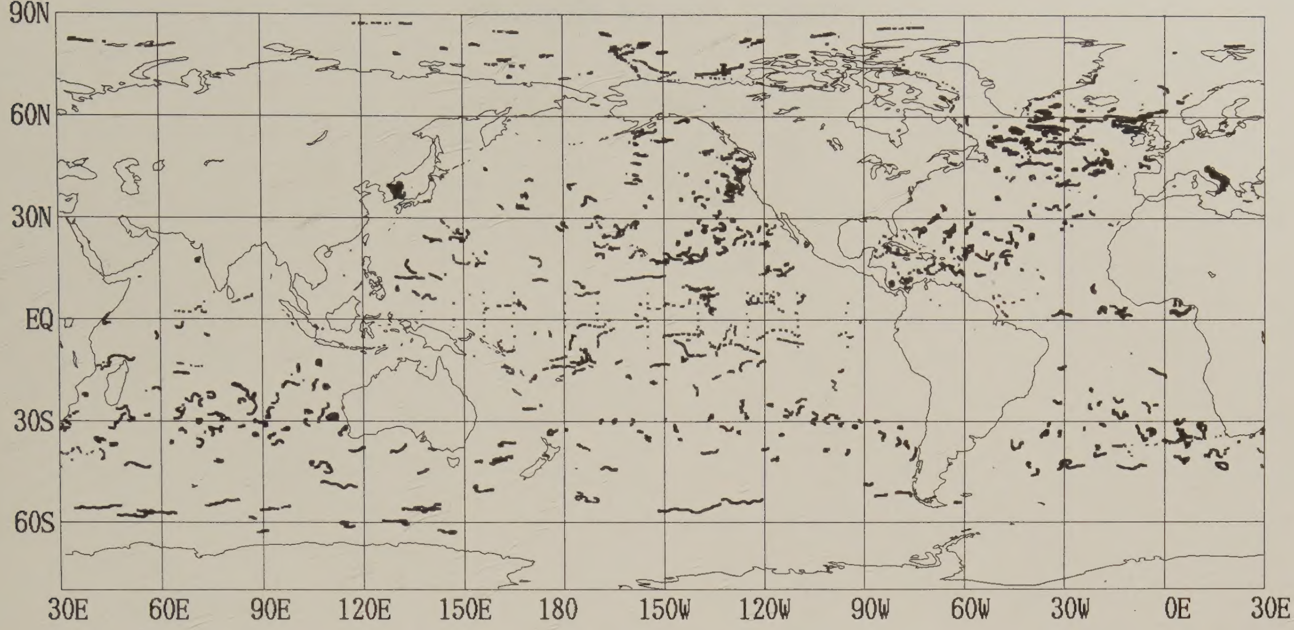
Geographical Distribution of Oceanographic Data



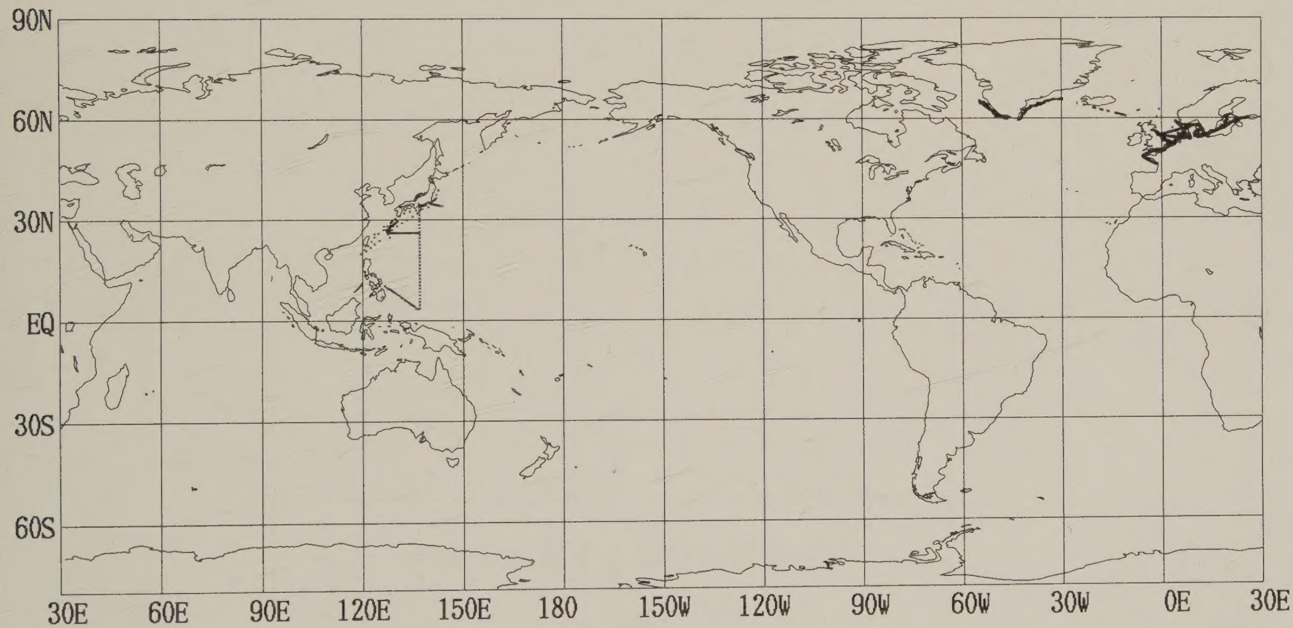


第29-1図　測点分布図(1998年10月)

Fig.29-1 Geographical distribution of SHIP messages (SST data, top) and BATHY/TESAC messages (subsurface temperature data, bottom) for OCT 1998.



BUOY messages　　　　　　Total data:234318



TRACKOB messages　　　　　　Total data:　2506

第29-2図　測点分布図(1998年10月)

Fig.29-2　Geographical distribution of BUOY messages (buoy drift and SST data, top) and TRACKOB messages (ship drift and SST data, bottom) for OCT 1998.

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